Appendix 4.4A
National Geospatial-Intelligence Agency Facility Relocation EIS, Traffic Approach Technical Memorandum

National Geospatial-Intelligence Agency Facility Relocation E.I.S. Traffic Operations Results Report

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1. Background

The purpose of this report is to document the results of the traffic analysis performed on the roadway network in the vicinity of each site being considered for the National Geospatial-Intelligence Agency (NGA) facility relocation. This report will also serve to document the methodologies and software programs used to evaluate the traffic operations at each site, as well as outlining any potential transportation improvement projects that could be used to mitigate operational issues that may result from the facility relocation.

2. Level of Service Definition and Guidelines

A Level of Service (LOS) analysis is the standard way in which the transportation industry evaluates the operational performance of various types of roadway facilities. The Highway Capacity Manual (HCM) defines LOS as "a quantitative stratification of a performance measure or measures that represent quality of service, measured on an A-F scale, with LOS A representing the best operating conditions from the traveler's perspective and LOS F the worst." A description of each letter grade of LOS is provided in the table below.

Level of Service	Description
A	Free flow with low volumes and high speeds
B	Reasonably free flow, but speeds beginning to be restricted by traffic conditions
C	In stable flow zone, but most drivers are restricted in the freedom to select their own speeds
D	Approaching unstable flow; drivers have little freedom to select their own speeds
E	Unstable flow; may be short stoppages
F	Unacceptable congestion; stop-and-go; forced flow.

Source: American Association of State Highway and Transportation Officials

Level of Service Thresholds

Different types of roadway facilities utilize different quantitative performance measures in order to determine LOS. Freeway facilities, ramps along freeway facilities, and freeway weaving segments all use the performance measure

of density, measured in passenger cars per hour per lane (pcphpl). Signalized and unsignalized intersections use the performance measure of delay, measured in seconds. The tables below show the range of values for each of these performance measures that apply to each LOS grade (source HCM).

Freeway and Ramp Level of Service Thresholds

LOS	Density Threshold Freeway (pcphpl)	Density Threshold Ramp (pcphpl)	Density Threshold Weave (pcphpl)
A	<= 11	<=10	<=10
B	>11 - 18	>10 - 20	>10 - 20
C	>18 - 26	>20 - 28	>20 - 28
D	>26 - 35	>28 - 35	>28 - 35
E	>35 - 45	>35	>35
F	>45	v/c > 1.0	v/c > 1.0

Signalized and Unsignalized Intersection Level of Service Thresholds

LOS	Delay Threshold Signalized(s)	Density Threshold Unsignalized(s)
A	<= 10	<=10
B	>11 - 20	>10 - 15
C	>20 - 35	>15 - 25
D	>35 - 55	>25 - 35
E	>55 - 80	>35 - 50
F	>80	>50

Level of Service Design Guidelines

Both the Missouri Department of Transportation (MoDOT) and the Illinois Department of Transportation (IDOT) provide guidance as to desired LOSs on roadways within their jurisdiction.

No guidance with regard to LOS was available for St. Louis County, St. Clair County, or the City of St. Louis; therefore MoDOT guidance was used for all roadways located in Missouri and IDOT guidance was used for all roadways located in Illinois. Below are the guidelines from IDOT and MoDOT. Note that IDOT and MoDOT consider all of the site locations to be in the urban environment. Also note that IDOT specifies guidelines for the "design year," which is generally 20 years post construction. MoDOT specifies that their guidelines are for 20 years post construction.

IDOT recommended design year Level of Service (source IDOT Bureau of Design and Environment)

- Freeways – rural B, urban C, major urban D can be considered
- Expressways – rural B, urban C
- Urban highways and streets – C

- Rural two lane – principal arterials B, minor arterials C

MoDOT recommended 20-year Level of Service (source MoDOT Engineering Policy Guide)

- Rural corridors – D peak hour, C off-peak
- Urban corridors – E peak hour, D off-peak

3. Analysis Methodology—Scenarios, Software, and Assumptions

Analysis Scenarios

The roadway networks around each site were analyzed for both the existing year (2014), and the future year (2040). Even though the new NGA facility is not expected to open until approximately 2022, the year 2014 was analyzed in order to determine the immediate impacts to the transportation system because an analysis of the year 2014 could be directly compared with the existing conditions. The year 2040 was chosen as the future year (design year), because it is approximately 20 years after the anticipated opening of the new facility. The existing year and the future year analyses consisted of both No Build and Build scenarios. The No Build scenario analyzed the existing roadway network as it is today, without the NGA facility in place. The Build scenario analyzed the existing roadway network with the NGA facility in place and thus included the increase in traffic volumes that would result from the NGA workforce. Each analysis scenario was analyzed for the AM and PM weekday peak hour.

The existing year traffic volumes used in the analysis were based primarily on count data, but were supplemented with assumptions for 2014 volumes based on data from East-West Gateway Coordinating Council of Government's (EWG) regional travel demand model for 2010. The future year traffic volumes were based on growth factors determined by reviewing data from EWG's regional travel demand model for 2040. The specific hours used for the AM and PM peak hours for the No Build analysis (both existing year and future year) were based on current traffic counts, while the specific hours used for the AM and PM peak hours for the Build analysis (both existing year and future year) took into account the anticipated traffic patterns to/from the new NGA facility.

When performing the traffic analysis for each scenario at each potential facility relocation site, locations that were found to be operating at worse LOSs than the MoDOT/IDOT recommended guidelines for the No Build scenario were identified. If the increase in density/delay at these locations due to the increased volume from the NGA facility was found to be greater than 10 percent during the Build scenario analysis, the location was determined to warrant mitigation. Additionally, any location that crossed the threshold from an acceptable LOS to an undesirable LOS due to the traffic volume generated by the NGA facility was determined to warrant mitigation, provided the increase in density/delay was greater than 10 percent.

Analysis Software

Because of the large amount of roadway segments to be analyzed, a two-level approach to the traffic analysis was implemented. An initial analysis of the roadway network at each site was performed using a primarily deterministic (equation based) capacity models. After this initial analysis, areas of each network that were found to be the most

congested and/or the most affected by the increase in traffic volume due to the new facility were further analyzed using microsimulation models.

For the initial analysis, the freeway segments, ramp merge and diverge, and freeway weaving segments were all analyzed using Highway Capacity Software (HCS 2010), which is based on the methodologies described in the Highway Capacity Manual (HCM 2010). These methodologies are purely deterministic. The signalized and unsignalized intersections were analyzed using the software program Synchro/Simtraffic. Synchro/Simtraffic is a hybrid of deterministic and microsimulation models.

Areas found to warrant further analysis were analyzed using the software program VISSIM (version 5.40). VISSIM is a microsimulation model. Microsimulation models are defined as stochastic models that simulate traffic behavior based on random distributions of driver behavioral attributes such as gap acceptance, vehicle arrivals, car following, lane changing, etc. (source ITE.org)

Assumptions

The assumptions used in the analysis include the following.

- Peak Hour Factor – 0.92 used for highly developed urban/suburban areas, 0.88 used for less developed urban/suburban areas, 0.95 used for the St. Clair County Site (provided by IDOT)
- At signalized intersections, pedestrian phases only taken into account where they exist currently.
- Minimum cycle length – 60 seconds (2 or 3 phase signal), 80 seconds (4 phase signal)
- Maximum cycle length – 120 seconds
- Yellow time – 4 seconds
- All red time – 1 second
- Minimum split (thru) – 12 seconds (if no pedestrian phase)
- Minimum split (left) – 8 seconds
- At signalized intersections, the control type was assumed to be actuated-coordinated
- Pedestrian volumes were based on field observation, but not formal counts. No pedestrians were observed at the Mehlville, Fenton, or St. Clair County site, and therefore pedestrian volumes are assumed to be zero at those sites. Several pedestrians were observed at the St. Louis City site, and therefore an assumption of 20 pedestrians/hour for all movements with an existing crosswalk was assumed. Locations without crosswalks were assumed to have zero pedestrians, as no illegal crossings were observed in the field.

4. Fenton Site – former Chrysler Plant

The Fenton Site roadway network is located in Missouri and consists of Interstate 44 (I-44) between Missouri Route 141 and Interstate 270 (I-270), North and South Outer Roads between Route 141 and I-270, the slip ramps to

and from I-44 in the same area, and the signalized intersections along North and South Outer Roads at Valley Park Road and Bowles Avenue. The unsignalized intersection of Bowles Avenue and Larkin Williams Drive was also included (see Figure 1 at the end of this report).

The tables below show the results of the initial LOS analysis at the Fenton site. LOSs that are worse than the recommended guidelines for their particular jurisdiction are highlighted. Because of the lack of volume data for the unsignalized intersections within the network, and because the new entrances to the NGA facility are located on very low volume roads that essentially dead end into the facility, there were no unsignalized intersections analyzed for the Fenton Site. Locations where there was no increase in volume due to the new NGA facility or the increase was found to be negligible are labeled as "no change" in the Build scenario results tables.

No Build 2014 Analysis

Freeway Segments	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour
I-44 EB west of MO 141	29.2	D	17.9	B
I-44 EB between MO 141 and Bowles	36.1	E	20.6	C
I-44 EB at Bowles	29.1	D	17.9	B
I-44 EB between Bowles and Mraz	27.1	D	17.0	B
I-44 EB at Mraz	37.9	E	21.3	C
I-44 WB at Mraz	19.2	C	32.1	D
I-44 WB between Mraz and Bowles	20.8	C	36.4	E
I-44 WB at Bowles	21.9	C	39.8	E
I-44 WB between Bowles and MO 141	22.9	C	43.1	E
I-44 WB west of MO 141	18.8	C	31.3	D

Ramp Merge and Diverge	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour
I-44 EB off-ramp at MO 141	22.1	C	13.3	B
I-44 EB on-ramp at MO 141 (slip ramp)	18.7	B	8.1	A
I-44 EB off-ramp at Bowles (slip ramp)	48.6	E	31.7	D
I-44 EB off-ramp at Mraz (slip ramp)	27.3	C	18.8	B
I-44 EB on-ramp at Mraz (slip ramp)	32.2	D	21.2	C
I-44 WB on-ramp at Mraz (slip ramp)	20.9	C	31.7	D
I-44 WB on-ramp at Bowles (slip ramp)	26.2	C	41.5	**F**
I-44 WB off-ramp at MO 141 (slip ramp)	26.1	C	36.2	E
I-44 WB on-ramp at MO 141	22.9	C	33.2	D

Weaving Segments	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour

I-44 EB between Mraz/S. Outer Rd and I-270	--	**F**	--	**F**
I-44 WB between I-270 and Soccer Park/Mraz	21.2	C	--	**F**

Signalized Intersections	Delay (seconds) AM peak hour	LOS AM peak hour	Delay (seconds) PM peak hour	LOS PM peak hour
MO 141 at N. Outer Rd	66.8	E	186.6	**F**
MO 141 at S. Outer Rd	69.1	E	43.8	D
Valley Park Rd at N. Outer Rd	19.8	B	17.2	B
Valley Park Rd at S. Outer Rd	18.2	B	14.1	B
Bowles at N. Outer Rd	33.8	C	33.0	C
Bowles at S. Outer Rd	22.4	C	33.6	C

Unsignalized Intersections	Delay (seconds) AM peak hour	LOS AM peak hour	Delay (seconds) PM peak hour	LOS PM peak hour
Bowles at Larkin Williams Dr.	7.5 (NBL) 9.6 (EBTR) 11.5 (WBTL)	A (NBL) A (EBTR) B (WBTL)	7.3 (NBL) 9.0 (EBTR) 9.6 (WBTL)	A (NBL) A (EBTR) A (WBTL)

Note: Because this is a three-way intersection with stop control for the eastbound and westbound movements and free flow for the northbound movements, only the eastbound and westbound movements and the northbound left turn will experience any delay.

These results show that currently all of the freeway segments analyzed are operating at an acceptable LOS based on the guidelines defined by MoDOT; however one of the ramps and one signalized intersection are operating at a LOS worse than the guidelines defined by MoDOT. The weaving segments were also found to be operating at a LOS worse than what is recommended; however these segments are not standard configurations that can be accurately analyzed using HCS. The results shown for the weaving analysis are likely worse than the actual operations, and therefore these areas were analyzed further using VISSIM. The results of the VISSIM analysis are discussed in the "Areas Further Analyzed with Microsimulation" section of this report.

No Build 2040 Analysis

As stated previously, traffic volumes for 2040 were determined based on data from the EWG regional travel demand model. These data showed that most roadways in the Fenton analysis network will experience flat or negative growth between now and 2040. The exception being Bowles Avenue. Because Bowles Avenue is the only roadway that is expected to experience growth, it was the only one analyzed for the 2040 No Build analysis. The results are shown in the tables below.

Signalized Intersections	Delay (seconds) AM peak hour	LOS AM peak hour	Delay (seconds) PM peak hour	LOS PM peak hour
Bowles at N. Outer Rd	38.0	D	37.6	D
Bowles at S. Outer Rd	24.7	C	48.2	D

Unsignalized Intersections	Delay (seconds) AM peak hour	LOS AM peak hour	Delay (seconds) PM peak hour	LOS PM peak hour
	7.5 (NBL)	A (NBL)	7.3 (NBL)	A (NBL)
	9.6 (EBTR)	A (EBTR)	9.0 (EBTR)	A (EBTR)
Bowles at Larkin Williams Dr.	11.5 (WBTL)	B (WBTL)	9.6 (WBTL)	A (WBTL)

Note: Because this is a three-way intersection with stop control for the eastbound (EBTR) and westbound (WBTL) movements and free flow for the northbound movements, only the eastbound and westbound movements and the northbound left turn (NBL) will experience any delay.

These results show that the intersections along Bowles Avenue near the site will continue to operate at acceptable LOSs in 2040.

Build 2014 Analysis

In order to determine the volumes used for the Build scenario, traffic counts were performed at the existing NGA facility. These volumes were then added to the volumes used for the No Build scenario. A detailed description of the routing assumptions is contained in Appendix A, ***NGA Facility Relocation EIS Traffic Approach Technical Memorandum***.

Freeway Segments	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour
I-44 EB west of MO 141	29.3	D	No change	No change
I-44 EB between MO 141 and Bowles	36.3	E	No change	No change
I-44 EB at Bowles	29.2	D	No change	No change
I-44 EB between Bowles and Mraz	27.2	D	No change	No change
I-44 EB at Mraz	No change	No change	No change	No change
I-44 WB at Mraz	No change	No change	No change	No change
I-44 WB between Mraz and Bowles	No change	No change	No change	No change
I-44 WB at Bowles	No change	No change	40.1	E
I-44 WB between Bowles and MO 141	No change	No change	43.4	E
I-44 WB west of MO 141	No change	No change	31.5	D

Ramp Merge and Diverge	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour
I-44 EB off-ramp at MO 141	No change	No change	No change	No change
I-44 EB on-ramp at MO 141 (slip ramp)	No change	No change	No change	No change
I-44 EB off-ramp at Bowles (slip ramp)	No change	No change	No change	No change
I-44 EB off-ramp at Mraz (slip ramp)	28.7	D	No change	No change
I-44 EB on-ramp at Mraz (slip ramp)	No change	No change	No change	No change
I-44 WB on-ramp at Mraz (slip ramp)	No change	No change	No change	No change

I-44 WB on-ramp at Bowles (slip ramp)	No change	No change	41.9	**F**
I-44 WB off-ramp at MO 141 (slip ramp)	No change	No change	No change	No change
I-44 WB on-ramp at MO 141	No change	No change	No change	No change

Weaving Segments	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour
I-44 EB between Mraz/S. Outer Rd and I-270	No change	No change	--	**F**
I-44 WB between I-270 and Soccer Park/Mraz	22.9	C	No change	No change

Signalized Intersections	Delay (seconds) AM peak hour	LOS AM peak hour	Delay (seconds) PM peak hour	LOS PM peak hour
MO 141 at N. Outer Rd	53.3	D	190.5	**F**
MO 141 at S. Outer Rd	73.7	E	36.9	D
Valley Park Rd at N. Outer Rd	19.4	B	17.9	B
Valley Park Rd at S. Outer Rd	17.9	B	13.9	B
Bowles at N. Outer Rd	33.9	C	46.0	D
Bowles at S. Outer Rd	26.8	C	64.5	E

Unsignalized Intersections	Delay (seconds) AM peak hour	LOS AM peak hour	Delay (seconds) PM peak hour	LOS PM peak hour
Bowles at Larkin Williams Dr.	7.5 (NBL) 9.6 (EBTR) 11.5 (WBTL)	A (NBL) A (EBTR) B (WBTL)	7.3 (NBL) 9.0 (EBTR) 10.8 (WBTL)	A (NBL) A (EBTR) B (WBTL)

Note: Because this is a three-way intersection with stop control for the eastbound and westbound movements and free flow for the northbound movements, only the eastbound and westbound movements and the northbound left turn will experience any delay.

These results show that all of the freeway segments and unsignalized intersections continue to operate within the MoDOT recommended LOS guidelines with the new NGA facility in place. The ramp segment, weaving segment, and the signalized intersection found to be operating at LOS F in the No Build analysis were also found to be operating at LOS F with the new NGA facility in place.

Build 2040 Analysis

As stated previously, most roadways in the Fenton analysis network will experience flat or negative growth between now and 2040. The exception being Bowles Avenue. Because Bowles Avenue is the only roadway that is expected to experience growth, it was the only one analyzed, and the results are shown in the tables below.

Signalized Intersections	Delay (seconds) AM peak hour	LOS AM peak hour	Delay (seconds) PM peak hour	LOS PM peak hour
Bowles at N. Outer Rd	35.3	D	46.4	D

Bowles at S. Outer Rd	26.9	C	66.8	E

Unsignalized Intersections	Delay (seconds) AM peak hour	LOS AM peak hour	Delay (seconds) PM peak hour	LOS PM peak hour
Bowles at Larkin Williams Dr.	7.5 (NBL) 9.6 (EBTR) 11.5 (WBTL)	A (NBL) A (EBTR) B (WBTL)	7.3 (NBL) 9.0 (EBTR) 10.8 (WBTL)	A (NBL) A (EBTR) B (WBTL)

Note: Because this is a three-way intersection with stop control for the eastbound and westbound movements and free flow for the northbound movements, only the eastbound and westbound movements and the northbound left turn will experience any delay.

These results show that the intersections along Bowles Avenue near the site will continue to operate at acceptable LOSs in 2040 with the new NGA facility in place.

Areas Further Analyzed with Microsimulation

The weaving segment on I-44 eastbound between Mraz Lane/on-ramp from the South Outer Road and I-270 in the PM peak hour was determined to warrant further analysis in VISSIM due to the preliminary analysis finding that this segment was operating at LOS F, and there being a significant increase in traffic along this segment due to the proposed NGA facility. There were three other locations found to be operating at LOS F as well; however these locations were determined to not warrant further analysis because they either did not experience any increase in traffic due to the NGA facility, or the increase in traffic was so small that the effect on operations was minimal. Additionally, the weaving segment analyzed in VISSIM for the PM peak was also found to be operating at LOS F in the AM peak; however because there will be no increase in traffic due to the NGA facility in the AM peak, it was not analyzed in VISSIM. A summary of these findings is provided below.

Analysis Location and Period	Analysis type	Increase in vehicles due to NGA facility (vph)	Delay(s)/Density (pcphpl) No Build scenario	Delay(s)/Density (pcphpl) Build scenario	Percent Increase
I-44 WB on-ramp at Bowles (slip ramp), PM peak	Ramp Merge	20	41.5 pcphpl (2014)	41.9 pcphpl (2014)	1%
I-44 EB between Mraz/S. Outer Rd and 270, AM peak	Weave	No change	--	--	0%
I-44 WB between 270 and Soccer Park/Mraz, PM peak	Weave	No change	--	--	0%
MO 141 at N. Outer Rd, PM peak	Signalized Intersection	20	186.6 s (2014)	190.5 s (2014)	2%

In order to properly calibrate the existing condition VISSIM model for the weaving segment on I-44 eastbound between Mraz Lane/South Outer Road on-ramp and I-270, several travel time runs were performed in the field. After developing and calibrating an existing model, a new model was developed that incorporated the additional volume generated by the proposed NGA facility. The results of the model output showed that the weaving segment in question will operate at LOS D or better with the new NGA facility in place. This result is better than what was

determined from the preliminary analysis, which was expected due to the previously discussed limitations of the preliminary analysis methodology.

Operational Issues and Potential Mitigation Strategies

No mitigation is needed for the weaving segment on I-44 eastbound between Mraz Lane/South Outer Road on-ramp and I-270 since it was found to be operating at an acceptable LOS based on MoDOT's recommended guidelines.

5. Mehlville Site – former MetLife facility

The Mehlville Site roadway network is located in Missouri and consists of I-270 in the vicinity of the Tesson Ferry Road interchange, Interstate 55 (I-55) in the vicinity of the Butler Hill Road interchange, the interchange ramps at the I-270/Tesson Ferry Road and I-55/Butler Hill Road interchanges, and the signalized intersections along Tesson Ferry Road between I-270 and Old Tesson Ferry Road and along Butler Hill Road between Tesson Ferry Road and I-55 (see Figure 2 at the end of this report).

The tables below show the results of the initial LOS analysis at the Mehlville site. LOSs that are worse than the recommended guidelines for their particular jurisdiction are highlighted. Note that there were no weaving segments within the analysis network for the Mehlville site. Additionally, because of the lack of volume data for the unsignalized intersections within the network, the only unsignalized intersection analyzed was the new entrance to the NGA facility, which is located just south of the signalized intersection at Tesson Ferry/Old Tesson Ferry. This intersection does not exist currently and therefore was only analyzed for the Build scenarios. Locations where there was no increase in volume due to the new NGA facility or the increase was found to be negligible are labeled as "no change" in the Build Scenario results table.

No Build 2014 Analysis

Freeway Segments	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour
I-270 EB west of Tesson Ferry Rd	19.9	C	26.0	C
I-270 EB east of Tesson Ferry Rd	18.6	C	23.9	C
I-270 WB east of Tesson Ferry Rd	25.8	C	19.8	C
I-270 WB west of Tesson Ferry Rd	26.1	D	20.0	C
I-55 SB north of Butler Hill Rd	13.9	B	17.4	B
I-55 SB south of Butler Hill Rd	15.4	B	19.3	C
I-55 NB south of Butler Hill Rd	19.5	C	15.5	B
I-55 NB north of Butler Hill Rd	17.7	B	14.2	B

Ramp Merge and Diverge	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour
I-55 NB off at Butler Hill Rd	20.9	C	17.2	B
I-55 SB on at Butler Hill Rd	14.2	B	17.6	B

Signalized Intersections	Delay (seconds) AM peak hour	LOS AM peak hour	Delay (seconds) PM peak hour	LOS PM peak hour
Tesson Ferry Rd at I-270 WB ramp terminal	31.4	C	24.4	C
Tesson Ferry Rd at I-270 EB ramp terminal	16.8	B	48.3	D
Tesson Ferry Rd at Mattis Rd	78.3	E	71.8	E
Tesson Ferry Rd at Kennerly Rd	54.4	D	64.5	E
Tesson Ferry Rd at Schuessler Rd	14.7	B	36.3	D
Tesson Ferry Rd at Bauer Rd	17.8	B	19.0	B
Tesson Ferry Rd at Butler Hill Rd	51.3	D	28.5	C
Tesson Ferry Rd at Old Tesson Ferry Rd	8.7	A	17.7	B
Butler Hill Rd at Ambs Rd	6.1	A	7.9	A
Butler Hill Rd at Kerth Rd	12.2	B	34.5	C
Butler Hill Rd at Ozark Glen Dr	21.3	C	38.4	D
Butler Hill Rd at I-55 SB ramp terminal	22.0	C	21.9	C
Butler Hill Rd at I-55 NB ramp terminal	31.8	C	18.6	B

These results show that currently, all of the roadway facilities analyzed are operating at an acceptable LOS based on the guidelines defined by MoDOT.

No Build 2040 Analysis

As was the case for the Fenton site, data for 2040 provided by EWG showed that most roadways in the Mehlville analysis network will experience flat or negative growth between now and 2040. The exception being I-55 and the ramps to/from I-55 at Butler Hill Road. Because these roadways are the only ones that are expected to experience growth, they were the only ones analyzed for the 2040 No Build analysis.

Freeway Segments	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour
I-55 SB south of Butler Hill Rd	15.5	B	19.8	C
I-55 NB south of Butler Hill Rd	20.0	C	15.6	B

Ramp Merge and Diverge	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour
I-55 NB off at Butler Hill Rd	21.2	C	17.5	C
I-55 SB on at Butler Hill Rd	16.1	B	19.7	B

Signalized Intersections	Delay (seconds) AM peak hour	LOS AM peak hour	Delay (seconds) PM peak hour	LOS PM peak hour
Butler Hill Rd at I-55 SB ramp terminal	22.2	C	21.9	C
Butler Hill Rd at I-55 NB ramp terminal	32.1	C	18.6	B

These results show that all of the roadway facilities will continue to operate at acceptable LOSs based on MoDOT guidelines in 2040 under the No Build scenario.

Build 2014 Analysis

As mentioned previously, in order to determine the volumes used for the Build scenario, traffic counts were performed at the existing NGA facility. These volumes were then added to the volumes used for the No Build scenario. A detailed description of the routing assumptions is contained in the ***NGA Facility Relocation EIS Traffic Approach Technical Memorandum***, included as Appendix A.

Freeway Segments	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour
I-270 EB west of Tesson Ferry Rd	20.5	C	No change	No change
I-270 EB east of Tesson Ferry Rd	No change	No change	24.9	C
I-270 WB east of Tesson Ferry Rd	26.9	D	No change	No change
I-270 WB west of Tesson Ferry Rd	No change	No change	20.6	C
I-55 SB north of Butler Hill Rd	No change	No change	No change	No change
I-55 SB south of Butler Hill Rd	No change	No change	19.7	C
I-55 NB south of Butler Hill Rd	19.9	C	No change	No change
I-55 NB north of Butler Hill Rd	No change	No change	No change	No change

Ramp Merge and Diverge	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour
I-55 NB off at Butler Hill Rd	21.8	C	No change	No change
I-55 SB on at Butler Hill Rd	No change	No change	18.4	B

Signalized Intersections	Delay (seconds) AM peak hour	LOS AM peak hour	Delay (seconds) PM peak hour	LOS PM peak hour
Tesson Ferry Rd at I-270 WB ramp terminal	36.3	D	29.4	C
Tesson Ferry Rd at I-270 EB ramp terminal	23.3	C	56.2	E
Tesson Ferry Rd at Mattis Rd	73.9	E	106.0	**F**
Tesson Ferry Rd at Kennerly Rd	87.7	**F**	72.3	E
Tesson Ferry Rd at Schuessler Rd	15.2	B	38.3	D
Tesson Ferry Rd at Bauer Rd	18.7	B	19.3	B
Tesson Ferry Rd at Butler Hill Rd	56.4	D	60.4	E
Tesson Ferry Rd at Old Tesson Ferry Rd	3.5	A	5.4	A
Butler Hill Rd at Ambs Rd	8.9	A	9.2	A
Butler Hill Rd at Kerth Rd	13.4	B	47.7	D
Butler Hill Rd at Ozark Glen Dr	25.9	C	40.2	D
Butler Hill Rd at I-55 SB ramp terminal	23.1	C	22.1	C

Signalized Intersections	Delay (seconds) AM peak hour	LOS AM peak hour	Delay (seconds) PM peak hour	LOS PM peak hour
Butler Hill Rd at I-55 NB ramp terminal	32.6	C	21.6	C

Unsignalized Intersections	Delay (seconds) AM peak hour	LOS AM peak hour	Delay (seconds) PM peak hour	LOS PM peak hour
Tesson Ferry Rd at entrance to NGA facility	11.1 (NBL) 13.1 (EBR) 83.6 (EBL)	B (NBL) B (EBR) **F (EBL)**	13.6 (NBL) 9.8 (EBR) 123.7 (EBL)	B (NBL) B (EBR) **F (EBL)**

Note: Because this is a three-way intersection with stop control for the eastbound movements (EBL, EBR) and free flow for the northbound and southbound movements, only the eastbound movements and the northbound left turn (NBL) will experience any delay.

These results show that while all of the freeway and ramp segments would continue to operate within the recommended LOS guidelines with the new NGA facility in place, two of the signalized intersections, Tesson Ferry Road at Mattis Road (PM only) and Tesson Ferry Road at Kennerly Road (AM only) would operate at LOS F and therefore exceed the MoDOT recommended LOS guidelines. Additionally, the eastbound left turn movement at the unsignalized intersection of Tesson Ferry Road at the new entrance to the NGA facility would operate at LOS F in both the AM and PM peak hours. Because of this, it is assumed that almost all of the traffic exiting the NGA facility will use the northernmost entrance at Butler Hill Road, which is signalized. Values shown in the tables above reflect this assumption.

Build 2040 Analysis

As stated previously, traffic volumes provided in the EWG model for 2040 showed that most roadways in the Mehlville network are expected to experience flat or negative growth between now and 2040. The exception is I-55 and the ramps to/from I-55 at Butler Hill Road. Because these are the only locations that are expected to experience growth, they were the only ones analyzed, and the results are shown in the tables below.

Freeway Segments	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour
I-55 SB south of Butler Hill Rd	No change	No change	20.2	C
I-55 NB south of Butler Hill Rd	20.4	C	No change	No change

Ramp Merge and Diverge	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour
I-55 NB off at Butler Hill Rd	22.1	C	No change	No change
I-55 SB on at Butler Hill Rd	No change	No change	20.8	C

Signalized Intersections	Delay (seconds) AM peak hour	LOS AM peak hour	Delay (seconds) PM peak hour	LOS PM peak hour
Butler Hill Rd at I-55 SB ramp terminal	23.2	C	22.2	C
Butler Hill Rd at I-55 NB ramp terminal	32.9	C	21.6	C

These results show that no new operational problems will develop in 2040 under the Build scenario; however the problems identified in the Build 2014 analysis will likely still exist.

Areas Further Analyzed with Microsimulation

The segment of Tesson Ferry Road between I-270 and the new entrance to the NGA facility was determined to warrant further analysis in VISSIM due to the preliminary analysis finding that some of the intersections were operating at LOS F. Because the segment of Tesson Ferry Road between I-270 and the new entrance to the NGA facility is not expected to experience growth in the future, it was only analyzed for 2014. The freeway segments, ramps, and signalized intersections along Butler Hill Road were all found to be operating within MoDOT's recommended guidelines and therefore were not analyzed further.

In order to properly calibrate the existing condition VISSIM model, several travel time runs were performed in the field for each direction of travel along Tesson Ferry Road during both the AM and PM peak hours. Additionally, the volumes used in the preliminary analysis were further refined to balance volumes between intersections. The existing condition model results obtained from VISSIM were much better at the problematic intersections than what was determined in the preliminary analysis. This was largely due to the calibration effort, which found that traveling from one end of the corridor to the other could be done fairly quickly and without major delays. After developing and calibrating an existing model, a new model was developed that incorporated the additional volume generated by the proposed NGA facility. This new model included revised/optimized signal timings, and the removal of all traffic volume generated by the existing MetLife facility that resides on the proposed NGA facility site. The results of this model output showed that for both the AM and PM peak hours, all of the signalized intersections will operate at LOSs within MoDOT's recommended guidelines; however the unsignalized intersection at the southernmost entrance to the NGA facility continued to display undesirable operations. For this reason, this intersection was analyzed as a signalized intersection. The tables below summarize the results of both the existing VISSIM analysis and the Build VISSIM analysis.

Signalized Intersections (Existing Condition)	Delay (seconds) AM peak hr	LOS AM peak hr	Delay (seconds) PM peak hr	LOS PM peak hr
Tesson Ferry Rd at I-270 WB ramp terminal	25.9	C	22.9	C
Tesson Ferry Rd at I-270 EB ramp terminal	29.6	C	23.1	C
Tesson Ferry Rd at Mattis Rd	20.9	C	17.3	B
Tesson Ferry Rd at Kennerly Rd	23.5	C	51.6	D
Tesson Ferry Rd at Schuessler Rd	9.3	A	27.5	D
Tesson Ferry Rd at Bauer Rd	8.6	A	5.5	A
Tesson Ferry Rd at Butler Hill Rd	10.4	B	13.8	B
Tesson Ferry Rd at Old Tesson Ferry Rd	6.3	A	16.9	B

Signalized Intersections (Build Analysis)	Delay (seconds) AM peak hr	LOS AM peak hr	Delay (seconds) PM peak hr	LOS PM peak hr

Tesson Ferry Rd at I-270 WB ramp terminal	20.5	C	20.7	C
Tesson Ferry Rd at I-270 EB ramp terminal	19.4	B	15.7	B
Tesson Ferry Rd at Mattis Rd	15.1	B	20.5	C
Tesson Ferry Rd at Kennerly Rd	27.1	C	35.9	D
Tesson Ferry Rd at Schuessler Rd	12.3	B	30.6	C
Tesson Ferry Rd at Bauer Rd	8.1	A	5.5	A
Tesson Ferry Rd at Butler Hill Rd	14.3	B	46.7	D
Tesson Ferry Rd at Old Tesson Ferry Rd	5.5	A	5.5	A
Tesson Ferry Rd at new NGA entrance	3.5	A	20.9	C

Operational Issues and Potential Mitigation Strategies

After reviewing the results of the VISSIM analysis, the only location within the Mehlville roadway network found to have operational issues, and therefore need mitigation, was the unsignalized intersection at the new entrance to the NGA facility. The mitigation strategy for this intersection is to install a traffic signal. With signalization, this intersection will operate at LOS C or better. Installation of a traffic signal would need to be done in coordination with MoDOT, as there are several other access points and traffic signals in close proximity to the new intersection. Because the LOS without this improvement was found to be worse than the recommended MoDOT guidelines in the 2014 Build analysis, it is recommended that the traffic signal be implemented as part of the initial project construction. Additionally, it is recommended that the preliminary site plan be reviewed to see if there are any opportunities for access point consolidation or reconfiguration that may eliminate the need for a traffic signal in this location.

6. St. Louis City Site

The St. Louis City Site roadway network is located in Missouri, and consists of Interstate 64 (I-64) in the vicinity of the Jefferson Avenue interchange, Interstate 70/44 between 10th/11th Streets and Cass Avenue, the interchange ramps at the I-64/Jefferson and I-70/Cass Avenue interchanges, and the slip ramps to and from I-70 from 10th/11th Streets. It also includes the signalized intersections along Jefferson Avenue between I-64 and Cass Avenue, the signalized intersections along Cass Avenue between Jefferson Avenue and Broadway, and the signalized intersections along New Florissant Road between St. Louis Avenue and Cass Avenue (see Figure 3 at the end of this report).

Note that the intersections along New Florissant Road and two of the intersections on Cass Avenue were only analyzed for the PM peak hour. These intersections are located along a section of the evening egress route likely taken by employees desiring to access I-70 eastbound/I-44 westbound; however because of the one-way nature of some of the roads in the vicinity, these intersections are not part of the corresponding morning ingress route. As a result, these intersections will only be affected by NGA commuter traffic during the evening egress and, therefore, were not included in the AM peak hour analysis.

The tables below show the results of the initial LOS analysis at the St. Louis City site. LOSs that are worse than the recommended guidelines for their particular jurisdiction are highlighted. Note that because all of the affected ramps were either weaving segments or lane adds/drops, there were no ramp merge or diverge segments analyzed for the St. Louis City site. Also note that the locations mentioned previously that were found to only be affected during the evening egress are labeled as "PM only" in the signalized intersection results table below. Additionally, because of the lack of volume data for the unsignalized intersections within the network, the only unsignalized intersections analyzed were the new entrances to the NGA facility. One of the entrances is located on Jefferson Avenue north of Cass Avenue, and the other two are located on Cass Avenue between Jefferson Avenue and 20th Street. These intersections do not exist currently and therefore were only analyzed for the Build scenarios. Locations where there was no increase in volume due to the new NGA facility or the increase was found to be negligible are labeled as "no change" in the Build Scenario results table.

No Build 2014 Analysis

Freeway Segments	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour
I-64 EB west of Ewing Ave	19.7	C	19.7	C
I-64 WB west of Market St	17.5	B	17.5	B
I-70 EB west of 11th St.	41.3	E	28.1	D
I-44 EB/I-70 WB south of 10th St.	43.3	E	28.2	D

Weaving Segments	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour
I-64 EB between Ewing Ave and Jefferson Ave	21.3	C	21.3	C
I-64 WB between Jefferson Ave and Market St	22.8	C	22.8	C
I-70 EB between 11th St and Cass Ave	38.6	E	23.9	C
I-70 WB between 10th St and Branch St	33.4	D	24.3	C

Signalized Intersections	Delay (seconds) AM peak hour	LOS AM peak hour	Delay (seconds) PM peak hour	LOS PM peak hour
Jefferson Ave at Cass Ave	13.4	B	12.6	B
Jefferson Ave at Dr Martin Luther King Dr	8.7	A	11.2	B
Jefferson Ave at Delmar Blvd	8.7	A	8.1	A
Jefferson Ave at Washington Ave	16.0	B	13.9	B
Jefferson Ave at Locust St	9.4	A	9.8	A
Jefferson Ave at Olive St	16.0	B	19.3	B
Jefferson Ave at Pine St	20.6	C	14.9	B
Jefferson Ave at Market St	27.0	C	27.9	C

Signalized Intersections	Delay (seconds) AM peak hour	LOS AM peak hour	Delay (seconds) PM peak hour	LOS PM peak hour
Jefferson Ave at I-64 WB on ramp	1.6	A	13.2	B
Jefferson Ave at I-64 EB off ramp	20.0	B	29.3	C
Cass Ave at 20th St	19.3	B	19.0	B
Cass Ave at 14th St	18.2	B	17.8	B
Cass Ave at N. Florissant Ave	22.6	C	22.8	C
Cass Ave at I-70 ramp terminal	10.5	B	24.5	C
Cass Ave at 9th Street	PM only	PM only	17.1	B
Cass Ave at Broadway	PM only	PM only	25.5	C
N. Florissant Ave at St. Louis Ave	PM only	PM only	14.2	B
N. Florissant Ave at N Market St	PM only	PM only	3.9	A
N. Florissant Ave at Madison St	PM only	PM only	4.8	A
N. Florissant Ave at 14th St	PM only	PM only	19.2	B

These results show that currently all of the roadway facilities analyzed are operating at an acceptable LOS based on the guidelines defined by MoDOT.

No Build 2040 Analysis

Traffic volumes for 2040 provided in the EWG model show that some of the roadways in the St. Louis City Site roadway network will experience growth in the future, while others will not. The roadways expected to experience growth were analyzed and the results are provided in the tables below.

Freeway Segments	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour
I-70 EB west of 11th St.	48.0	**F**	30.0	D
I-44 EB/I-70 WB south of 10th St.	46.2	**F**	29.3	D

Weaving Segments	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour
I-70 EB between 11th St and Cass Ave	--	**F**	27.0	C
I-70 WB between 10th St and Branch St	34.6	D	25.1	C

Signalized Intersections	Delay (seconds) AM peak hour	LOS AM peak hour	Delay (seconds) PM peak hour	LOS PM peak hour
Jefferson Ave at Cass Ave	15.4	B	15.8	B
Jefferson Ave at Dr Martin Luther King Dr	8.5	A	11.3	B

Jefferson Ave at Delmar Blvd	8.7	A	8.0	A
Jefferson Ave at Washington Ave	17.1	B	14.7	B
Cass Ave at 20th St	19.8	B	18.4	B
Cass Ave at 14th St	17.1	B	18.4	B
Cass Ave at N. Florissant Ave	22.2	C	24.1	C
Cass Ave at I-70 ramp terminal	25.0	C	58.2	E
Cass Ave at 9th Street	PM only	PM only	16.0	B
Cass Ave at Broadway	PM only	PM only	25.7	C

These results show that two of the freeway segments, and one of the weaving segments will be operating at LOS F in 2040. All of the signalized intersections will continue to operate at an acceptable LOS based on the guidelines defined by MoDOT.

Build 2014 Analysis

As stated previously, in order to determine the volumes used for the Build scenario, traffic counts were performed at the existing NGA facility. These volumes were then added to the volumes used for the No Build scenario. A detailed description of the routing assumptions is contained in the ***NGA Facility Relocation EIS Traffic Approach Technical Memorandum,*** included Appendix A.

Freeway Segments	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour
I-64 EB west of Ewing Ave	19.8	C	No change	No change
I-64 WB west of Market St	No change	No change	17.7	B
I-70 EB west of 11th St.	44.0	E	No change	No change
I-44 EB/I-70 WB south of 10th St.	45.6	**F**	No change	No change

Weaving Segments	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour
I-64 EB between Ewing Ave and Jefferson Ave	21.5	C	No change	No change
I-64 WB between Jefferson Ave and Market St	No change	No change	23.1	C
I-70 EB between 11th St and Cass Ave	39.0	E	25.6	C
I-70 WB between 10th St and Branch St	No change	No change	25.0	C

Signalized Intersections	Delay (seconds) AM peak hour	LOS AM peak hour	Delay (seconds) PM peak hour	LOS PM peak hour
Jefferson Ave at Cass Ave	12.8	B	17.5	B
Jefferson Ave at Dr Martin Luther King Dr	8.5	A	11.0	B
Jefferson Ave at Delmar Blvd	8.7	A	7.7	A

Jefferson Ave at Washington Ave	16.0	B	13.9	B
Jefferson Ave at Locust St	9.5	A	9.8	A
Jefferson Ave at Olive St	17.0	B	19.2	B
Jefferson Ave at Pine St	19.9	B	15.1	B
Jefferson Ave at Market St	30.1	C	30.6	C
Jefferson Ave at I-64 WB on ramp	1.5	A	17.7	B
Jefferson Ave at I-64 EB off ramp	23.8	C	34.1	C
Cass Ave at 20th St	17.2	B	14.9	B
Cass Ave at 14th St	16.3	B	18.2	B
Cass Ave at N. Florissant Ave	20.2	C	20.6	C
Cass Ave at I-70 ramp terminal	10.3	B	30.8	C
Cass Ave at 9th Street	PM only	PM only	16.6	B
Cass Ave at Broadway	PM only	PM only	26.7	C
N. Florissant Ave at St. Louis Ave	PM only	PM only	13.6	B
N. Florissant Ave at N Market St	PM only	PM only	3.5	A
N. Florissant Ave at Madison St	PM only	PM only	4.3	A
N. Florissant Ave at 14th St	PM only	PM only	19.2	B

Unsignalized Intersections	**Delay (seconds) AM peak hour**	**LOS AM peak hour**	**Delay (seconds) PM peak hour**	**LOS PM peak hour**
Jefferson Ave entrance to NGA	15.6 (WBL) 15.6 (WBR) 0.1 (SBL)	C (WBL) C (WBR) A (SBL)	80.2 (WBL) 80.2 (WBR) 0.1 (SBL)	**F (WBL)** **F (WBR)** A (SBL)
Cass Ave entrance west to NGA	13.1 (SBL) 13.1 (SBR) 0.1 (EBL)	B (SBL) B (SBR) A (EBL)	53.0 (SBL) 53.0 (SBR) 0.1 (EBL)	**F (SBL)** **F (SBR)** A (EBL)
Cass Ave entrance east to NGA (trucks)	15.4 (SBL) 15.4 (SBR) 0.1 (EBL)	C (SBL) C (SBR) A (EBL)	17.4 (SBL) 17.4 (SBR) 0.1 (EBL)	B (SBL) B (SBR) A (EBL)

Note: Because this is a three-way intersection with stop control for the entrance movements and free flow for Cass Ave and Jefferson Ave, only the movements out of the facility and the left turns into the facility will experience any delay.

These results show that with the NGA facility in place, one of the freeway segments will operate at LOS F. All of the weaving segments and signalized intersections will operate at an acceptable LOS based on the guidelines defined by MoDOT; however two of the new unsignalized entrances to the NGA facility will have movements that operate at LOS F during the evening peak hour.

Build 2040 Analysis

As stated previously, traffic volumes for 2040 provided in the EWG model show that some of the roadways in the St. Louis City Site roadway network will experience growth in the future, while others will not. The roadways

expected to experience growth were analyzed with the new NGA facility in place and the results are provided in the tables below.

Freeway Segments	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour
I-70 EB west of 11th St.	49.2	**F**	No Change	No Change
I-44 EB/I-70 WB south of 10th St.	48.8	**F**	No Change	No Change

Weaving Segments	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour
I-70 EB between 11th St and Cass Ave	--	**F**	28.8	D
I-70 WB between 10th St and Branch St	No Change	No Change	26.0	C

Signalized Intersections	Delay (seconds) AM peak hour	LOS AM peak hour	Delay (seconds) PM peak hour	LOS PM peak hour
Jefferson Ave at Cass Ave	15.3	B	20.0	B
Jefferson Ave at Dr Martin Luther King Dr	8.3	A	10.9	B
Jefferson Ave at Delmar Blvd	8.7	A	7.7	A
Jefferson Ave at Washington Ave	17.2	B	14.3	B
Cass Ave at 20th St	16.9	B	13.3	B
Cass Ave at 14th St	15.8	B	19.3	B
Cass Ave at N. Florissant Ave	20.1	C	19.1	B
Cass Ave at I-70 ramp terminal	23.7	C	63.0	E
Cass Ave at 9th Street	PM only	PM only	15.1	B
Cass Ave at Broadway	PM only	PM only	26.1	C

Unsignalized Intersections	Delay (seconds) AM peak hour	LOS AM peak hour	Delay (seconds) PM peak hour	LOS PM peak hour
Jefferson entrance to NGA	15.6 (WBL) 15.6 (WBR) 0.1 (SBL)	C (WBL) C (WBR) A (SBL)	80.2 (WBL) 80.2 (WBR) 0.1 (SBL)	**F (WBL)** **F (WBR)** A (SBL)
Cass entrance west to NGA	14.4 (SBL) 14.4 (SBR) 0.2 (EBL)	B (SBL) B (SBR) A (EBL)	112.0 (SBL) 112.0 (SBR) 0.1 (EBL)	**F (SBL)** **F (SBR)** A (EBL)
Cass entrance east to NGA (trucks)	18.4 (SBL) 18.4 (SBR) 0.2 (EBL)	C (SBL) C (SBR) A (EBL)	22.0 (SBL) 22.0 (SBR) 0.1 (EBL)	C (SBL) C (SBR) A (EBL)

Note: Because this is a three-way intersection with stop control for the entrance movements and free flow for Cass Ave and Jefferson Ave, only the movements out of the facility and the left turns into the facility will experience any delay.

These results show that with the NGA facility in place, the two of the freeway segments and the weaving segment identified as operating at LOS F in 2040 for the No Build scenario will continue to operate at LOS F. All of the signalized intersections will continue to operate at an acceptable LOS based on the guidelines defined by MoDOT; however, the two new unsignalized entrances to the NGA facility found to have movements that operate at LOS F during the evening peak hour in 2014 will continue to do so in 2040.

Areas Further Analyzed with Microsimulation

There were no segments within the St. Louis City Site roadway network that were found to warrant further analysis in VISSIM. Both of the freeway segments and weaving segment found to be operating at LOS F were only minimally affected by the increase in volume due to the NGA facility. The table below summarizes these results.

Analysis Location and Period	Analysis type	Increase in vehicles due to NGA facility (vph)	Delay (s)/Density (pcphpl) No Build scenario	Delay (s)/Density (pcphpl) Build scenario	Percent Increase
I-70 EB west of 11th St, AM peak	Freeway	60	48.0 pcphpl (2040)	49.2 pcphpl (2040)	3%
I-44 EB/I-70 WB south of 10th St, AM peak	Freeway	150	46.2 pcphpl (2040)	48.8 pcphpl (2040)	6%
I-70 EB between 11th St and Cass Ave, AM peak[a]	Weave	60	38.6 pcphpl (2014)	39.0 pcphpl (2014)	1%

Note: [a] Because density is not calculated by the HCS weave module once LOS F is achieved, results show in the table are for 2014.

Two of the new unsignalized intersections at the proposed entrances into the NGA facility were also found to be operating at LOS F. Because the issues at these locations were straightforward, VISSIM analysis was not performed; however these intersections are discussed in the Operational Issues and Potential Mitigation Strategies section below.

Operational Issues and Potential Mitigation Strategies

The only operational issues at the St. Louis City Site were at two of the unsignalized intersections at the new entrances to the NGA facility. The mitigation strategy for these intersections is to install traffic signals. Because operations at these intersections were found to be worse than the recommended MoDOT guidelines in the 2014 Build analysis, the installation of these traffic signals should be part of the initial project construction. With signalization, these intersections will operate at LOS B or better in both 2014 and 2040.

7. St. Clair County Site

The St. Clair County Site roadway network is located in Illinois, and consists of I-64 between U.S. Route 50 (US 50) and Rieder Road, the interchange ramps at the I-64/US 50 and I-64/Rieder Road interchanges, the signalized intersections along Rieder Road between I-64 and Wherry Road, the signalized intersection of Illinois Route 158 at Wherry Road, and the unsignalized intersection of Wherry Road at the Wherry Road connection (see Figure 4 at the end of this report).

The tables below show the results of the initial LOS analysis at the Scott Air Force Base site. LOSs that are worse than the recommended guidelines for their particular jurisdiction are highlighted. Because not all of the proposed improvements in the vicinity of the new Rieder Road interchange will be constructed in the short term, the 2014 and 2040 roadway networks vary slightly. In 2014, there is a Wherry Road Connector that connects existing Wherry Road where it bends to the south to Wherry Road/Chocktaw Road. In 2040, the Wherry Road Connector will no longer be necessary due to the Rieder Road extension, and therefore will be removed. Additionally, the intersection of Wherry Road at Rieder Road will be set up with a traffic signal in 2014; however because the south leg of the intersection will not yet be constructed, and the east leg is not expected to have any traffic, the west leg and north leg will essentially operate in a free flow condition. In 2040, this intersection will have all four legs and will have normal signal operation. Other than the 2014 Wherry Road Connector at Wherry Road intersection, the only unsignalized intersections analyzed were the new entrances to the NGA facility, which are located on Wherry Road, one on the portion of Wherry that runs east-west, and two on the portion of Wherry Road that bends to the south (future Rieder Road extension). These intersections do not exist currently and therefore were only analyzed for the Build scenarios. Locations where there was no increase in volume due to the new NGA facility or the increase was found to be negligible are labeled as “no change” in the Build Scenario results table. Also, note that there were no weaving segments within the analysis network for the St. Clair County site.

No Build 2014 Analysis

Freeway Segments	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour
I-64 EB west of US 50/IL 158	9.5	A	8.5	A
I-64 EB west of Rieder Rd	4.5	A	7.3	A
I-64 EB east of Rieder Rd	3.0	A	11.6	B
I-64 WB east of Rieder Rd	13.6	B	14.3	B
I-64 WB west of Rieder Rd	9.1	A	11.0	A
I-64 WB west of US 50/IL 158	12.1	B	12.8	B

Ramp Merge and Diverge	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour
I-64 EB off at Rieder Rd	7.4	A	10.1	B
I-64 EB on at Rieder Rd	5.9	A	15.8	B
I-64 WB off at Rieder Rd	17.3	B	18.2	B
I-64 WB on at Rieder Rd	12.3	B	14.7	B
I-64 EB off to US 50 SB	16.3	B	13.5	B
I-64 WB on from US 50 NB	13.8	B	15.9	B

Signalized Intersections	Delay (seconds) AM peak hour	LOS AM peak hour	Delay (seconds) PM peak hour	LOS PM peak hour
Rieder Rd at I-64 WB ramp terminal	2.6	A	9.5	A
Rieder Rd at I-64 EB ramp terminal	10.9	B	13.8	B
Rieder Rd at Wherry Rd	Free Flow	--	Free Flow	--
IL 158 at Wherry Rd	9.6	A	22.4	C

Unsignalized Intersections	Delay (seconds) AM peak hour	LOS AM peak hour	Delay (seconds) PM peak hour	LOS PM peak hour
Wherry Rd at Wherry Rd Connection	8.7 (WBL/T) 11.4 (NBL/R)	A (WBL/T) B (NBL/R)	4.9 (WBL/T) 11.0 (NBL/R)	A (WBL/T) B (NBL/R)

Note: Because this is a three-way intersection with stop control for the northbound movement and free flow for the eastbound and westbound movements, only the northbound movements and the westbound shared thru/left turn will experience any delay.

These results show that currently all of the roadway facilities analyzed are operating at an acceptable LOS based on the guidelines defined by IDOT. There are no freeway segments, ramps, or intersections that are operating at an undesirable LOS.

No Build 2040 Analysis

Traffic volumes for 2040 provided by IDOT and in the EWG model show that all of the roadways in the St. Clair County Site roadway network are expected to experience growth in the future. As a result, all of the roadways analyzed for 2014 were analyzed for 2040 and the results are provided in the tables below.

Freeway Segments	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour
I-64 EB west of US 50/IL 158	18.2	C	12.8	B
I-64 EB west of Rieder Rd	8.8	A	11.4	B
I-64 EB east of Rieder Rd	5.2	A	19.2	C
I-64 WB east of Rieder Rd	23.5	C	20.7	C
I-64 WB west of Rieder Rd	12.4	B	16.1	B
I-64 WB west of US 50/IL 158	18.6	C	21.7	C

Ramp Merge and Diverge	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour
I-64 EB off at Rieder Rd	14.8	B	15.7	B
I-64 EB on at Rieder Rd	8.3	A	24.0	C
I-64 WB off at Rieder Rd	28.2	**D**	25.5	C
I-64 WB on at Rieder Rd	16.7	B	21.2	C

Ramp Merge and Diverge	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour
I-64 EB off to US 50 SB	26.3	C	19.2	B
I-64 WB on from US 50 NB	19.5	B	23.4	C

Signalized Intersections	Delay (seconds) AM peak hour	LOS AM peak hour	Delay (seconds) PM peak hour	LOS PM peak hour
Rieder Rd at I-64 WB ramp terminal	19.7	B	14.5	B
Rieder Rd at I-64 EB ramp terminal	29.8	C	14.1	B
Rieder Rd at Wherry Rd	18.2	B	28.7	C
IL 158 at Wherry Rd	6.4	A	26.5	C

These results show that one of the ramp segments analyzed operates at an LOS worse than desired based on IDOT guidelines in 2040. All of the freeway segments and signalized intersections, however, continue to operate at an acceptable LOS. Note that due to future construction by others, the unsignalized intersection of Wherry Road at the Wherry Road Connector will no longer be in place and, therefore, was not analyzed.

Build 2014 Analysis

As stated previously, in order to determine the volumes used for the Build scenario, traffic counts were performed at the existing NGA facility. These volumes were then added to the volumes used for the No Build scenario. A detailed description of the routing assumptions is contained in the ***NGA Facility Relocation EIS Traffic Approach Technical Memorandum***, included as Appendix A to this report.

Freeway Segments	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour
I-64 EB west of US 50/IL 158	11.5	B	No change	No change
I-64 EB west of Rieder Rd	5.5	A	No change	No change
I-64 EB east of Rieder Rd	No change	No change	No change	No change
I-64 WB east of Rieder Rd	No change	No change	No change	No change
I-64 WB west of Rieder Rd/IL 158	No change	No change	12.0	B
I-64 WB west of US 50	No change	No change	14.9	B

Ramp Merge and Diverge	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour
I-64 EB off at Rieder Rd	9.3	A	No change	No change
I-64 EB on at Rieder Rd	No change	No change	No change	No change

Ramp Merge and Diverge	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour
I-64 WB off at Rieder Rd	No change	No change	No change	No change
I-64 WB on at Rieder Rd	No change	No change	16.5	B
I-64 EB off to US 50 SB	19.2	B	No change	No change
I-64 WB on from US 50 NB	No change	No change	18.7	B

Signalized Intersections	Delay (seconds) AM peak hour	LOS AM peak hour	Delay (seconds) PM peak hour	LOS PM peak hour
Rieder Rd at I-64 WB ramp terminal	4.3	A	13.6	B
Rieder Rd at I-64 EB ramp terminal	10.5	B	12.2	B
Rieder Rd at Wherry Rd	5.7	A	14.3	B
IL 158 at Wherry Rd	14.4	B	37.8	**D**

Unsignalized Intersections	Delay (seconds) AM peak hour	LOS AM peak hour	Delay (seconds) PM peak hour	LOS PM peak hour
Wherry Rd at Wherry Rd Connection	4.1 (WBL/T) 17.5 (NBL/R)	A (WBL/T) C (NBL/R)	2.1 (WBL/T) 14.8 (NBL/R)	A (WBL/T) B (NBL/R)
Wherry Rd entrance to NGA	4.6 (WBL/T) 12.4 (NBL/R)	A (WBL/T) B NBL/R)	0.2 (WBL/T) 13.7 (NBL/R)	A (WBL/T) B (NBL/R)
Wherry Connector/Rieder Rd entrance to NGA north	12.4 (EBL/R) 2.5 (NBL/T)	B (EBL/R) A (NBL/T)	16.2 (EBL/R) 0.1 (NBL/T)	C (EBL/R) A (NBL/T)
Wherry Connector/Rieder Rd entrance to NGA south	11.2 (EBL/R) 1.8 (NBL/T)	B (EBL/R) A (NBL/T)	10.6 (EBL/R) 0.1 (NBL/T)	B (EBL/R) A (NBL/T)

Note:
Because these are three-way intersections with stop control for the northbound Wherry Rd Connection and the NGA facility entrances and free flow for the Wherry Rd movements, only the northbound Wherry Rd Connection movements, the NGA facility entrance movements and the Wherry Rd shared thru/left turn will experience any delay.

These results show that all of the freeway segments, all of the ramp merge and diverge segments, and all of the unsignalized intersections continue to operate within the IDOT recommended LOS guidelines with the new NGA facility in place, however delay at the signalized intersection of IL 158 at Wherry Road increases to the threshold for LOS D, which is worse than desired based on the IDOT guidelines.

Build 2040 Analysis

As stated previously, traffic volumes for 2040 provided by IDOT and in the EWG model show that all of the roadways in the St. Clair County Site roadway network are expected to experience growth in the future. As a result, all of the roadways analyzed for 2014 were analyzed for 2040 and the results are provided in the tables below.

Freeway Segments	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour
I-64 EB west of US 50/IL 158	20.6	C	No change	No change
I-64 EB west of Rieder Rd	9.9	A	No change	No change
I-64 EB east of Rieder Rd	No change	No change	No change	No change
I-64 WB east of Rieder Rd	No change	No change	No change	No change
I-64 WB west of Rieder Rd	No change	No change	17.3	B
I-64 WB west of US 50/IL 158	No change	No change	24.6	C

Ramp Merge and Diverge	Density (pcphpl) AM peak hour	LOS AM peak hour	Density (pcphpl) PM peak hour	LOS PM peak hour
I-64 EB off at Rieder Rd	16.7	B	No change	No change
I-64 EB on at Rieder Rd	No change	No change	No change	No change
I-64 WB off at Rieder Rd	No change	No change	No change	No change
I-64 WB on at Rieder Rd	No change	No change	23.0	C
I-64 EB off to US 50 SB	28.8	**D**	No change	No change
I-64 WB on from US 50 NB	No change	No change	24.8	C

Signalized Intersections	Delay (seconds) AM peak hour	LOS AM peak hour	Delay (seconds) PM peak hour	LOS PM peak hour
Rieder Rd at I-64 WB ramp terminal	21.6	C	12.9	B
Rieder Rd at I-64 EB ramp terminal	39.4	**D**	13.9	B
Rieder Rd at Wherry Rd	14.9	B	31.8	C
IL 158 at Wherry Rd	5.6	A	59.7	**E**

Unsignalized Intersections	Delay (seconds) AM peak hour	LOS AM peak hour	Delay (seconds) PM peak hour	LOS PM peak hour
Wherry Rd entrance to NGA	0.2 (WBL/T) 30.4 (NBL/R)	A (WBL/T) **D (NBL/R)**	0.1 (WBL/T) 695.2 (NBL/R)	A (WBL/T) **F (NBL/R)**
Wherry Connector/Rieder Rd entrance to NGA north	16.9 (EBL/R) 0.9 (NBL/T)	C (EBL/R) A (NBL/T)	37.9 (EBL/R) 0.1 (NBL/T)	**E (EBL/R)** A (NBL/T)
Wherry Connector/Rieder Rd entrance to NGA south	24.6 (EBL/R) 0.8 (NBL/T)	C (EBL/R) A (NBL/T)	12.8 (EBL/R) 0.1 (NBL/T)	B (EBL/R) A (NBL/T)

Note:
Because these are three-way intersections with stop control for the northbound Wherry Rd Connection and the NGA facility entrances and free flow for the Wherry Rd movements, only the northbound Wherry Rd Connection movements, the NGA facility entrance movements and the Wherry Rd shared thru/left turn will experience any delay.

These results show that one of the ramp segments and two of the signalized intersections operate at an LOS worse than desired based on IDOT guidelines in 2040. In addition, two of the new unsignalized intersections to the NGA facility have movements that operate at LOSs worse than the IDOT recommended guidelines. All of the freeway segments continue to operate at an acceptable LOS in 2040 with the NGA facility in place. Note that due to future construction by others, the unsignalized intersection of Wherry Road at the Wherry Road Connector will no longer be in place and, therefore, was not analyzed.

Areas Further Analyzed with Microsimulation

There were no segments within the St. Clair County Site roadway network that were found to warrant further analysis in VISSIM. There were two ramps found to be operating at an LOS worse than IDOT's recommended guidelines; however the increase in volume and subsequent effect on operations was found to either be none or minimal. Additionally, there were two signalized intersections found to be operating at levels of service worse than IDOT's recommended guidelines. Because these intersections are not part of a congested urban environment and the issues observed in the preliminary analysis would be limited to the specific intersection being analyzed, a VISSIM analysis was not determined to be necessary. The effect on operations was however found to be fairly significant, therefore mitigation strategies were developed and are discussed in the section below. The table below summarizes these findings.

Analysis Location and Period	Analysis type	Increase in vehicles due to NGA facility (vph)	Delay (s)/Density (pcphpl) No Build scenario	Delay (s)/Density (pcphpl) Build scenario	Percent Increase
I-64 WB off ramp at Rieder Rd, AM peak	Ramp	No change	28.2 pcphpl (2040)	28.2 (pcphpl) (2040)	0%
I-64 EB off ramp to US 50 SB, AM peak	Ramp	200	26.3 pcphpl (2040)	28.8 pcphpl (2040)	9%
IL 158 at Wherry Rd, PM peak	Signalized Intersection	270	22.4 s (2014) 26.5 s (2040)	37.8 s (2014) 59.7 s (2040)	69% (2014) 125% (2040)
Rieder Rd at I-64 EB off ramp, AM peak	Signalized Intersection	250	29.8 s (2040)	39.4 s (2040)	33%

Two of the new unsignalized intersections at the proposed entrances into the NGA facility were also found to be operating at LOS F. Because the issues at these locations were straightforward, VISSIM analysis was not performed; however these intersections are discussed in the Operational Issues and Potential Mitigation Strategies section below.

Operational Issues and Potential Mitigation Strategies

The two signalized intersections found to have operational issues were the IL 158 at Wherry Road intersection, and the I-64 eastbound off ramp at Rieder Road intersection. In both cases, acceptable levels of service can be obtained by constructing additional right turn capacity at one leg of the intersection. At the IL 158/Wherry Road intersection,

it is recommended that a westbound right turn lane with approximately 500 feet of storage be added to the east leg of the intersection. Because the LOS without this improvement was found to be worse than the recommended IDOT guidelines in the 2014 Build analysis, it is recommended that the turn lane be implemented as part of the initial project construction. At the I-64 eastbound off ramp/Rieder Road intersection, it is recommended that the current configuration of a single right turn lane on the off ramp be revised to be a dual right turn lane. Because operations at this signal were not found to be worse than the recommended IDOT guidelines in the 2014 Build analysis, but were found to be worse in the 2040 Build analysis, this improvement would not need to be implemented until sometime in future. With the addition of these turn lanes, both signals will operate at LOS C or better for both 2014 and 2040.

In addition to the two signalized intersections discussed above, two of the unsignalized intersections at the new entrances to the NGA facility were found to operate at LOSs worse than IDOT's recommended guidelines. The mitigation strategy for these intersections would be to install traffic signals. Because operations at these intersections were not found to be worse than the recommended IDOT guidelines in the 2014 Build analysis, but were found to be worse in the 2040 Build analysis, these improvements would not need to be implemented until sometime in future. With signalization, these intersections would operate at LOS C or better.

8. Summary of Improvements

In summary, none of the four sites being considered for the NGA facility will require major improvements to the surrounding transportation network. Areas of existing congestion will become more congested; however, in most cases the impact of the NGA facility is minimal. Locations where the NGA facility will have a more significant effect and thus require mitigation are summarized by site below.

Fenton Site

No transportation improvements needed.

Mehlville Site

Add a traffic signal at the new entrance into the NGA facility south of Old Tesson Ferry Road (immediate).

St. Louis City Site

Add a traffic signal at two of the new entrances into the NGA facility, one on Jefferson Avenue and one on Cass Avenue (immediate).

St. Clair County Site

Add a right turn lane westbound at the IL 158/Wherry Road intersection (immediate).

Add an additional right turn lane eastbound at the I-64 EB/Rieder Road intersection (future).

Add a traffic signal at two of the new entrances into the NGA facility, one on Wherry Road and one on Rieder Road (future).

9. Additional Information

For more detailed information on how traffic volumes were determined and what routing assumptions were used, refer to Appendix A.

Figures

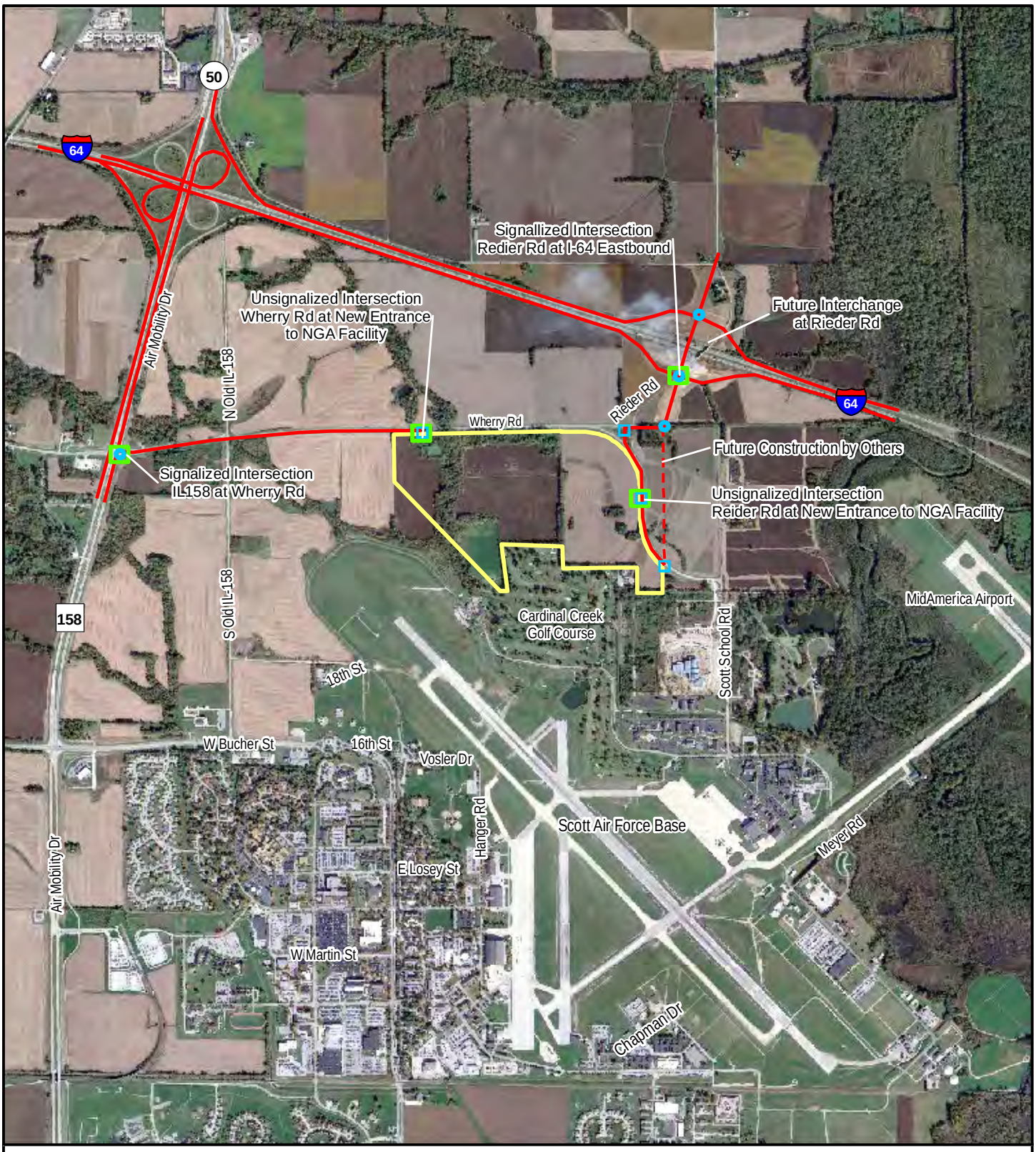


Figure 4.4-4
Location of Transportation Impacts - St. Clair County Site
NGA EIS

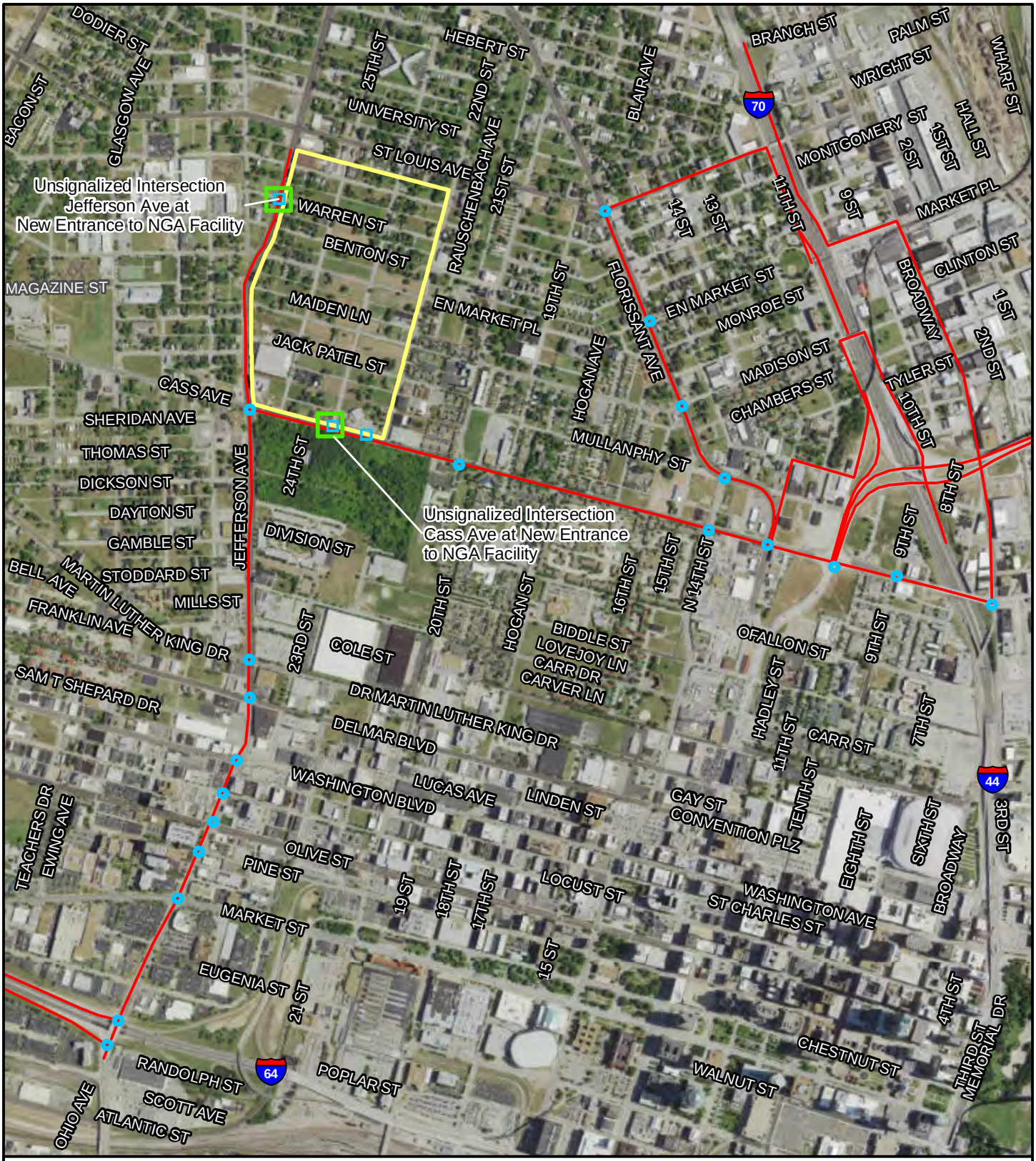


Figure 4.4-3
Location of Transportation Impacts - St. Louis City Site
NGA EIS

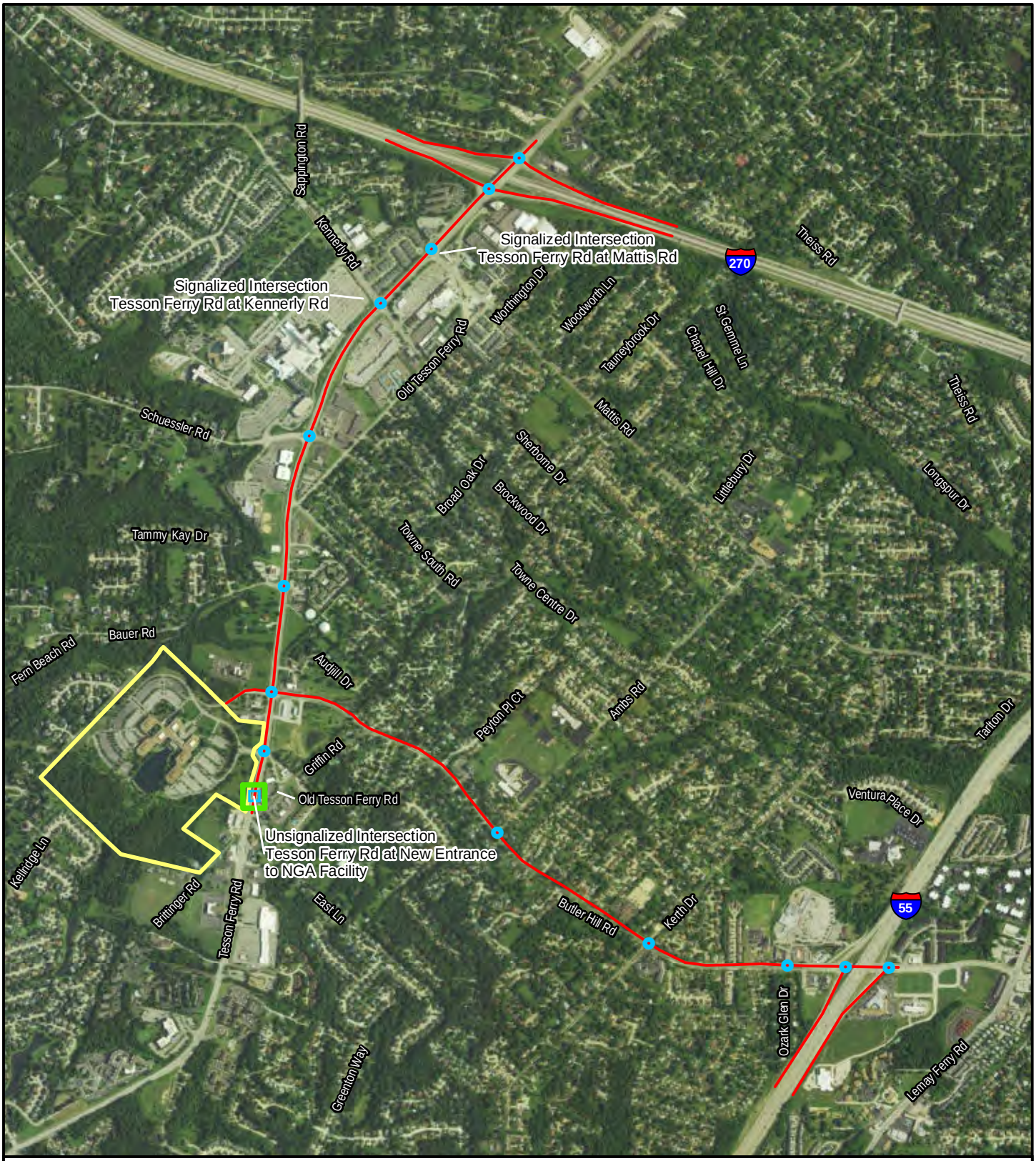
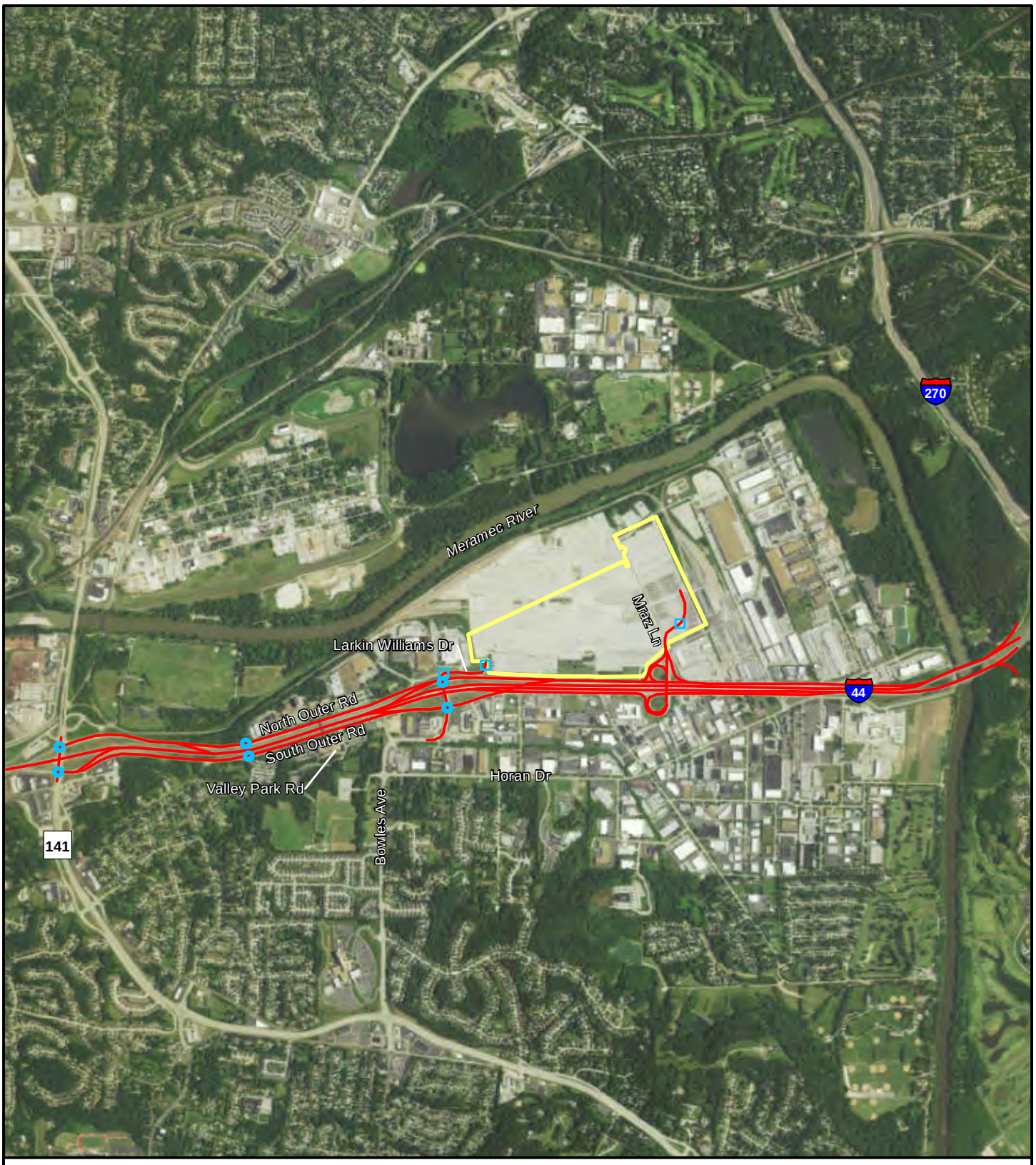


Figure 4.4-2
Location of Transportation Impacts - Mehlville Site
NGA EIS



Proposed Site

Roadways

Unsignalized Intersections Analyzed

Signalized Intersections Analyzed

N

0 0.25 0.5 0.75 1 Miles

Image Source: Esri, Microsoft, Image Flown 2/2/2012

Figure 4.4-1
Location of Transportation Impacts - Fenton Site
NGA EIS

Appendix A
NGA Facility Relocation EIS
Traffic Approach Technical Memorandum

National Geospatial-Intelligence Agency Facility Relocation EIS Traffic Approach Technical Memorandum

PREPARED FOR:	U.S. Army Corps of Engineers, Kansas City District and National Geospatial-Intelligence Agency
PREPARED BY:	CH2M HILL
DATE:	December 30, 2014

Background

The purpose of this technical memorandum (TM) is to document the methods and assumptions used in the traffic analysis of the roadway network in the vicinity of each site being considered for the National Geospatial-Intelligence Agency (NGA) facility relocation. This TM will also serve to document the proposed analysis scenarios (years, times of day, days of the week), as well as the method for determining the traffic volumes at each of the locations to be analyzed for each scenario.

Roadway Networks to be Analyzed

The proposed roadway network to be analyzed for each site will generally consist of the most direct path to/from the site to the nearest interchange with an interstate roadway. For some sites there will be multiple paths due to several interstate options that could be used for access to the site. The specific locations to be analyzed for each site are described below. Note that Highway Capacity Manual (HCM) methodologies will be used for the analysis, and therefore ramps configurations that include a lane add or a lane drop will not be analyzed as they are outside the scope of the HCM ramp merge and diverge methodology.

Fenton Site – Former Chrysler Facility

Freeway Segments

- Interstate 44 eastbound west of MO 141
- Interstate 44 eastbound between MO 141 and Bowles
- Interstate 44 eastbound at Bowles
- Interstate 44 eastbound between Bowles and Mraz
- Interstate 44 eastbound at Mraz
- Interstate 44 westbound at Mraz
- Interstate 44 westbound between Mraz and Bowles
- Interstate 44 westbound at Bowles
- Interstate 44 westbound between Bowles and MO 141

- Interstate 44 westbound west of MO 141

Ramp Merge/Diverge

- Interstate 44 eastbound off-ramp at MO 141
- Interstate 44 eastbound on-ramp at MO 141 (slip ramp)
- Interstate 44 eastbound off-ramp at Bowles (slip ramp)
- Interstate 44 eastbound off-ramp at Mraz (slip ramp)
- Interstate 44 eastbound on-ramp at Mraz (slip ramp)
- Interstate 44 westbound on-ramp at Mraz (slip ramp)
- Interstate 44 westbound on-ramp at Bowles (slip ramp)
- Interstate 44 westbound off-ramp at MO 141 (slip ramp)

Weaving Segments

- Interstate 44 eastbound between Mraz and I-270
- Interstate 44 westbound between I-270 and Soccer Park/Mraz

Signalized Intersections

- MO 141 at North Outer Rd
- MO 141 at South Outer Rd
- Valley Park Rd at North Outer Rd
- Valley Park Rd at South Outer Rd
- Bowles at North Outer Rd
- Bowles at South Outer Rd

Unsignalized Intersections

- Bowles at Larkin Williams

Mehlville Site – Former MetLife Facility

Freeway Segments

- Interstate 270 eastbound west of MO 21 (Tesson Ferry Rd)
- Interstate 270 eastbound east of MO 21 (Tesson Ferry Rd)
- Interstate 270 westbound east of MO 21 (Tesson Ferry Rd)
- Interstate 270 westbound west of MO 21 (Tesson Ferry Rd)
- Interstate 55 northbound south of Butler Hill Rd
- Interstate 55 southbound south of Butler Hill Rd

Ramp Merge/Diverge

- Interstate 55 northbound off-ramp at Butler Hill Rd
- Interstate 55 southbound on-ramp at Butler Hill Rd

Signalized Intersections

- I-270 WB off ramp at MO 21 (Tesson Ferry Rd)
- I-270 EB off ramp at MO 21 (Tesson Ferry Rd)
- MO 21 (Tesson Ferry Rd) at Mattis Rd
- MO 21 (Tesson Ferry Rd) at Kennerly Rd
- MO 21 (Tesson Ferry Rd) at Schuessler Rd
- MO 21 (Tesson Ferry Rd) at Bauer Rd
- MO 21 (Tesson Ferry Rd) at Butler Hill Rd
- MO 21 (Tesson Ferry Rd) at Old Tesson Ferry Rd
- Butler Hill Rd at Ambs Rd
- Butler Hill Rd at Kerth Rd
- Butler Hill Rd at Ozark Glen Dr
- I-55 southbound off ramp at Butler Hill Rd
- I-55 northbound off ramp at Butler Hill Rd

North St. Louis Site

Freeway Segments

- Interstate 64 eastbound west of Jefferson Ave
- Interstate 64 westbound west of Jefferson Ave
- Interstate 70 eastbound (southbound) west of 11th St
- Interstate 44 eastbound (northbound) south of 10th St

Ramp Merge/Diverge

- Interstate 44 eastbound (northbound) off-ramp at 10th St (ramp)

Weaving Segments

- Interstate 64 eastbound between Ewing Ave and Jefferson Ave
- Interstate 64 westbound between Jefferson Ave and Market St
- Interstate 70 eastbound (southbound) between 11th St and Cass Ave
- Interstate 70 westbound (northbound) between 10th St and Branch St

Signalized Intersections

- I-64 eastbound off-ramp at Jefferson Ave
- I-64 westbound on-ramp at Jefferson Ave
- Jefferson Ave at Market St
- Jefferson Ave at Pine St
- Jefferson Ave at Olive St

- Jefferson Ave at Locust St
- Jefferson Ave at Washington Ave
- Jefferson Ave at Delmar Blvd
- Jefferson Ave at Dr Martin Luther King Dr
- Jefferson Ave at Cass Ave
- Cass Ave at 20th St
- Cass Ave at 14th St
- Cass Ave at 13th St/N Florissant Ave
- Cass Ave at I-70 ramps/Tucker Blvd
- Cass Ave at 9th St
- Cass Ave at Broadway
- N Florissant Ave at St Louis Ave
- N Florissant Ave at N Market St
- N Florissant Ave at Madison St
- N Florissant Ave at 14th St

St. Clair County Site

Freeway Segments

- Interstate 64 eastbound west of Rieder Rd
- Interstate 64 eastbound east of Rieder Rd
- Interstate 64 westbound east of Rieder Rd
- Interstate 64 westbound west of Rieder Rd
- Interstate 64 eastbound west of IL 158
- Interstate 64 westbound west of IL 158

Ramp Merge/Diverge

- Interstate 64 eastbound off-ramp at Rieder Rd
- Interstate 64 eastbound on-ramp at Rieder Rd
- Interstate 64 westbound off-ramp at Rieder Rd
- Interstate 64 westbound on-ramp at Rieder Rd
- Interstate 64 eastbound off-ramp to IL 158 southbound
- Interstate 64 westbound on-ramp from IL 158 northbound

Signalized Intersections

- I-64 westbound off-ramp at Rieder Rd
- I-64 eastbound off-ramp at Rieder Rd

- Rieder Rd at Wherry Rd
- IL 158 at Wherry Rd

Unsignalized Intersections

- Wherry Rd at Wherry Rd Connection

Analysis Scenarios

The above described roadway networks will be analyzed for both the existing year (2014), and the future year (2040). The existing year and the future year analysis will consist of both the No-Build and Build scenarios. The Build scenario does not include any improvements to the existing roadway network, only an increase in traffic volume due to the NGA workforce. Each analysis scenario will be analyzed for the AM and PM weekday peak hour.

The AM and PM peak hours for the No Build analysis will be based on current traffic counts, while the peak hours for the Build analysis will take into account the anticipated traffic patterns to/from the new NGA facility.

Method for Determining Existing Year No Build Traffic Volumes

The roadways networks to be analyzed are quite large and span several different counties and two states. As a result, traffic data was gathered from several different sources, including the Missouri Department of Transportation, the Illinois Department of Transportation, St. Louis County and the East-West Gateway Council of Governments. Where there were gaps in the data provided by the sources listed above, traffic counts were performed by CH2M HILL; however because of the large size of many of the networks, it was not reasonable to count every location without existing data. Locations that were determined to be very low volume, or not along the primary path to/from the potential new site, or where volumes could reasonably be estimated based on land use, were not counted and volumes at these locations were based on engineering judgment and assumptions. Additionally, at some locations Annual Average Daily Traffic (AADT) data was available, but not peak hour volumes. AADT is defined as the average number of vehicles, calculated over a period of one year, passing a point on a road each day. In these situations, the closest location with 24 hour count data was examined and a percentage of daily traffic occurring for various directions in the AM and PM peak hour (K factor) was determined and applied to the AADT data to determine the AM and PM peak hour volumes. The specifics of how volumes were determined at each location are described in the bullet point list below.

Other factors used in the analysis that affect volume include the peak hour factor (PHF) and the percentage of heavy vehicles. The peak hour factor is the ratio of the total peak hourly volume to the peak 15 minute rate of flow within that hour. For urban, high volume areas, a PHF of 0.92 was used. For lower volume areas, a PHF of 0.88 was used. These are standard assumptions based on HCM methodology. A PHF of 0.95 was used for

the St. Clair County site, based on information provided by IDOT in the Rieder Rd Interchange Design Study. Truck percentages were based on actual count data, and by reviewing MoDOT AADT maps.

Fenton Site – former Chrysler facility

Freeway Segments

- Interstate 44 eastbound west of MO 141 -- **AADT (MoDOT), K from counts**
- Interstate 44 eastbound between MO 141 and Bowles -- **AADT (MoDOT), K from counts**
- Interstate 44 eastbound at Bowles -- **AADT (MoDOT), K from counts**
- Interstate 44 eastbound between Bowles and Mraz -- **AADT (MoDOT), K from counts**
- Interstate 44 eastbound at Mraz -- **AADT (MoDOT), K from counts**
- Interstate 44 westbound at Mraz -- **AADT (MoDOT), K from counts**
- Interstate 44 westbound between Mraz and Bowles -- **AADT (MoDOT), K from counts**
- Interstate 44 westbound at Bowles -- **AADT (MoDOT), K from counts**
- Interstate 44 westbound between Bowles and MO 141 -- **AADT (MoDOT), K from counts**
- Interstate 44 westbound west of MO 141 -- **AADT (MoDOT), K from counts**

Ramp Merge/Diverge

- Interstate 44 eastbound off-ramp at MO 141 -- **AADT (MoDOT), K from counts**
- Interstate 44 eastbound on-ramp at MO 141 (slip ramp) -- **AADT (MoDOT), K from counts**
- Interstate 44 eastbound off-ramp at Bowles (slip ramp) -- **AADT (MoDOT), K from counts**
- Interstate 44 eastbound off-ramp at Mraz (slip ramp) -- **AADT (MoDOT), K from counts**
- Interstate 44 eastbound on-ramp at Mraz (slip ramp) -- **AADT (MoDOT), K from counts**
- Interstate 44 westbound on-ramp at Mraz (slip ramp) -- **AADT (MoDOT), K from counts**
- Interstate 44 westbound on-ramp at Bowles (slip ramp) -- **AADT (MoDOT), K from counts**
- Interstate 44 westbound off-ramp at MO 141 (slip ramp) -- **AADT (MoDOT), K from counts**

Weaving Segments

- Interstate 44 eastbound between Mraz and I-270 -- **AADT (MoDOT), K from counts**
- Interstate 44 westbound between I-270 and Soccer Park/Mraz -- **AADT (MoDOT), K from counts**

Signalized Intersections

- MO 141 at North Outer Rd –**MoDOT 24 hr counts**
- MO 141 at South Outer Rd –**MoDOT 24 hr counts**
- Valley Park Rd at North Outer Rd –**CH2M HILL counts**
- Valley Park Rd at South Outer Rd –**CH2M HILL counts**
- Bowles at North Outer Rd –**CH2M HILL counts**
- Bowles at South Outer Rd –**CH2M HILL counts**

Unsignalized Intersections

- Bowles at Larkin Williams --**assumptions**

Mehlville Site – former MetLife facility

Freeway Segments

- Interstate 270 eastbound west of MO 21 (Tesson Ferry Rd)—**AADT (MoDOT), K from counts**
- Interstate 270 eastbound east of MO 21 (Tesson Ferry Rd)--**AADT (MoDOT), K from counts**
- Interstate 270 westbound east of MO 21 (Tesson Ferry Rd) --**AADT (MoDOT), K from counts**
- Interstate 270 westbound west of MO 21 (Tesson Ferry Rd) --**AADT (MoDOT), K from counts**
- Interstate 55 northbound south of Butler Hill Rd --**AADT (MoDOT), K from counts**
- Interstate 55 southbound south of Butler Hill Rd --**AADT (MoDOT), K from counts**

Ramp Merge/Diverge

- Interstate 55 northbound off-ramp at Butler Hill Rd --**AADT (MoDOT), K from counts**
- Interstate 55 southbound on-ramp at Butler Hill Rd --**AADT (MoDOT), K from counts**

Signalized Intersections

- I-270 WB off ramp at MO 21 (Tesson Ferry Rd) –**CH2M HILL counts**
- I-270 EB off ramp at MO 21 (Tesson Ferry Rd) –**CH2M HILL counts**
- MO 21 (Tesson Ferry Rd) at Mattis Rd –**CH2M HILL counts**
- MO 21 (Tesson Ferry Rd) at Kennerly Rd –**CH2M HILL counts**
- MO 21 (Tesson Ferry Rd) at Schuessler Rd –**CH2M HILL counts**
- MO 21 (Tesson Ferry Rd) at Bauer Rd –**East-West Gateway Regional Traffic Model**
- MO 21 (Tesson Ferry Rd) at Butler Hill Rd –**CH2M HILL counts**
- MO 21 (Tesson Ferry Rd) at Old Tesson Ferry Rd --**assumptions**
- Butler Hill Rd at Ambs Rd –**St Louis County 12 hr counts**
- Butler Hill Rd at Kerth Rd –**St Louis County 12 hr counts**
- Butler Hill Rd at Ozark Glen Dr –**St Louis County 12 hr counts**
- I-55 southbound off ramp at Butler Hill Rd –**CH2M HILL counts**
- I-55 northbound off ramp at Butler Hill Rd –**CH2M HILL counts**

North St. Louis Site

Freeway Segments

- Interstate 64 eastbound west of Jefferson Ave-- **AADT (MoDOT), K from counts**
- Interstate 64 westbound west of Jefferson Ave-- **AADT (MoDOT), K from counts**
- Interstate 70 eastbound (southbound) west of 11th St-- **AADT (MoDOT), K from counts**
- Interstate 44 eastbound (northbound) south of 10th St –**East-West Gateway Regional Traffic Model**

Ramp Merge/Diverge

- Interstate 44 eastbound (northbound) off-ramp at 10th St (ramp) -- **AADT (MoDOT), K from counts**

Weaving Segments

- Interstate 64 eastbound between Ewing Ave and Jefferson Ave -- **AADT (MoDOT), K from counts**
- Interstate 64 westbound between Jefferson Ave and Market St -- **AADT (MoDOT), K from counts**
- Interstate 70 eastbound (southbound) between 11th St and Cass Ave -- **AADT (MoDOT), K from counts**
- Interstate 70 westbound (northbound) between 10th St and Branch St -- **AADT (MoDOT), K from counts**

Signalized Intersections

- I-64 eastbound off-ramp at Jefferson Ave –**MoDOT 24 hr counts**
- I-64 westbound on-ramp at Jefferson Ave –**MoDOT 24 hr counts**
- Jefferson Ave at Market St –**CH2M HILL counts**
- Jefferson Ave at Pine St --**assumptions**
- Jefferson Ave at Olive St –**CH2M HILL counts**
- Jefferson Ave at Locust St --**assumptions**
- Jefferson Ave at Washington Ave –**CH2M HILL counts**
- Jefferson Ave at Delmar Blvd –**CH2M HILL counts**
- Jefferson Ave at Dr Martin Luther King Dr –**CH2M HILL counts**
- Jefferson Ave at Cass Ave –**CH2M HILL counts**
- Cass Ave at 20th St -- –**East-West Gateway Regional Traffic Model**
- Cass Ave at 14th St –**CH2M HILL counts**
- Cass Ave at N Florissant Ave/13th St –**CH2M HILL counts**
- Cass Ave at I-70 ramps/Tucker Blvd –**MoDOT 24 hr counts**
- Cass Ave at 9th St –**East-West Gateway Regional Traffic Model**
- Cass Ave at Broadway –**CH2M HILL counts**
- N Florissant Ave at St Louis Ave –**CH2M HILL counts**
- N Florissant Ave at N Market St -- **AADT (MoDOT), K from counts, assumptions**
- N Florissant Ave at Madison St –**CH2M HILL counts**
- N Florissant Ave at 14th St–**East-West Gateway Regional Traffic Model**

St. Clair County Site

Freeway Segments

- Interstate 64 eastbound west of Rieder Rd **–IDOT Interchange Design Study**

- Interstate 64 eastbound east of Rieder Rd **–IDOT Interchange Design Study**
- Interstate 64 westbound east of Rieder Rd **–IDOT Interchange Design Study**
- Interstate 64 westbound west of Rieder Rd **–IDOT Interchange Design Study**
- Interstate 64 eastbound west of IL 158 **–IDOT Interchange Design Study**
- Interstate 64 westbound west of IL 158 **–IDOT Interchange Design Study**

Ramp Merge/Diverge

- Interstate 64 eastbound off-ramp at Rieder Rd **–IDOT Interchange Design Study**
- Interstate 64 eastbound on-ramp at Rieder Rd **–IDOT Interchange Design Study**
- Interstate 64 westbound off-ramp at Rieder Rd **–IDOT Interchange Design Study**
- Interstate 64 westbound on-ramp at Rieder Rd **–IDOT Interchange Design Study**
- Interstate 64 eastbound off-ramp to IL 158 southbound **–IDOT Interchange Design Study**
- Interstate 64 westbound on-ramp from IL 158 northbound **–IDOT Interchange Design Study**

Signalized Intersections

- I-64 westbound off-ramp at Rieder Rd **–IDOT Interchange Design Study**
- I-64 eastbound off-ramp at Rieder Rd **–IDOT Interchange Design Study**
- Rieder Rd at Wherry Rd **–IDOT Interchange Design Study**
- IL 158 at Wherry Rd –**CH2M HILL counts**

Unsignalized Intersections

- Wherry Rd at Wherry Rd Connection **–IDOT Interchange Design Study**

Method for Determining Existing Year Build Traffic Volumes

The existing year build traffic volumes were calculated based on a combination of employee zip code data and weekday ingress and egress counts taken at the existing NGA facility. Zip code data was available for the nearly 3,000 current NGA employees. Weekday ingress and egress counts were taken at the St. Louis (2nd Street) Facility for a 3 hour period in the morning (5:30-8:30) and in the afternoon (2:30-5:30) on a typical weekday (Wednesday). Because a large portion of the NGA employees arrive and depart work earlier than the average commuter, a peak hour specific to the Build scenario was determined. In order to determine this Build peak hour, hourly volumes for the ingress and egress were summed with hourly volumes from 24 hour count data for the nearest intersection where data was available. This process was done for each potential facility relocation site. In general, the peak hours determined by this method were the same as those determined based on the 24 hour counts alone and thus the same as those used in the No Build analysis. For a few locations the morning peak hour shifted by 15 minutes. For these locations, the 24 hour counts at the nearest intersection were examined to determine if there was a significant reduction in volume due to the 15 minute shift. In all cases the reduction in volume was negligible and therefore no reduction factor was applied to the No Build volumes. Traffic volumes for the NGA employees were based on the existing facility count data for the

calculated Build peak hour, in combination with assumptions made for the most logical route to the new facility for each employee zip code. Note that because the Build peak hours are later than the peak arrival/departure times at the NGA facility, the traffic volume generated by the new facility used in the Build analysis is less than the peak ingress and egress hour as determined by the existing facility counts. Assumptions that went into the analysis include the following.

- Employees will keep the same commuting patterns (i.e. early arrival, early departure) after the facility moves from its current location to the new location.
- Employees that arrived at the current facility via bicycle, bus, or were dropped off were counted as vehicles due to the possibility that these options may not be available and/or desirable at the new facility.
- When selecting the most logical route for a given zip code, it was assumed that employees lived in the center of the zip code limits and that they would choose the closest interstate or highest speed roadway if no interstate was available to travel to and from the facility. It was also assumed that employees would use the interchange closet to the facility, and then the most direct route from the interchange to the facility. Rerouting due to congestion was not considered. Rerouting due to safety concerns about the neighborhood adjacent to the roadway was considered based upon feedback from NGA employees. Specific assumptions for each site for situations where more than one reasonable route could be considered are described in greater detail in the section below.
- The origin/destination of the volume arriving/departing the facility during the peak hour was assumed to be an even distribution of the employee zip code data. There was not data available to determine which specific employees arrived at specific times, therefore the percentage of employees living in each zip code was calculated, and that percentage was applied to the total number of vehicles that were determined to be arriving in the peak hour.
- It was assumed that no additional development will result from the new NGA facility. The Mehlville, Fenton, and North St. Louis sites are already developed, and the future year traffic volumes provided by IDOT for the new interchange at the St. Clair County site include future development.
- Because the Interchange Design Study for the new Rieder Road interchange assumed a warehouse facility at the location now being proposed for the new NGA facility, the future traffic volumes provided were adjusted for the Build Analysis. Assumptions were made for the size of the warehouse facility and number of employees, and these assumptions were then applied to formulas contained within the ITE Trip Generation Manual, 9th Edition. A warehouse size of 1,000,000 SF was assumed, along with an assumption of 200 employees. The numbers generated by these assumptions were then reduced by 50% in order to be conservative. The result was that 160 entering vehicles and 60 exiting

vehicles were removed from the AM peak hour volumes, and 60 entering and 160 exiting vehicles were removed from the PM peak hour.

- The employees will not move their households closer to the site.

Site Specific Routing Assumptions--Ingress

Mehlville Site

- Employees who will likely use I-270 westbound were assumed to exit at MO 21 (Tesson Ferry Rd) and travel south on MO 21 (Tesson Ferry Rd) to access the site rather than taking I-270 west to I-55 south to Butler Hill Road and traveling west on Butler Hill Road to access the site. This was due to MO 21 (Tesson Ferry Rd) being a higher speed, higher capacity route than Butler Hill Road.

- Because most employees will reach the northernmost entrance into the facility first, it was assumed that the majority of employees will use that entrance. Because it's directly across from Butler Hill Road, all employees using Butler Hill Road to access the site were assumed to use the northernmost entrance, and half of all other employees were also assumed to use that entrance. It's assumed that the remaining employees will use the southernmost entrance which may provide faster access to the south parking area and may be more desirable should back-ups take place at the northernmost entry gate.

Fenton Site

- Employees who will likely use I-44 eastbound were assumed to exit at the slip ramp directly east of Bowles Avenue, and use the Mraz Lane entrance to access the site. This route provides the most efficient access to the site as it allows the employees to bypass the signals at Bowles Avenue.

- Employees who will likely use I-44 westbound, via I-44 or I-270, were assumed to exit at Mraz Lane, and use the Mraz Lane entrance to access the site. This is the most direct route.

- Employees who will likely use MO-141 SB were assumed to use South Outer Rd. to northbound Bowles Avenue, and enter the site from Larkin Williams Drive. While it is possible to avoid the signal at Valley Park Road by entering I-44 eastbound and then immediately exiting in advance of Bowles Ave, it's anticipated that there will be less congestion on South Highway Drive than on I-44, and the South Highway Drive route does not require any merging.

- Employees who will likely use MO-141 NB were assumed to use northbound Bowles Avenue, and enter the site from Larkin Williams Drive, as this is the most direct route.

St. Clair County Site

- Employees who will likely use I-64 eastbound were assumed to exit either on IL-158 west or on Rieder Road to access the site. The traffic volume was split equally between the two routes, as both routes provide a direct connection to Wherry Road and are similar lengths.

- Employees who will likely use I-64 westbound were assumed to exit onto southbound Rieder Road to access the site, as this is the most direct connection to Wherry Road.
- Employees who will likely use US 50 eastbound were assumed to either use IL-158 westbound, or to take I-64 eastbound to Rieder Road. The volume was split equally between the two routes, as both routes provide a direct connection to Wherry Road and are similar lengths.
- Employees who will likely use IL-158 eastbound were assumed to enter the site using eastbound Wherry Road, as this is the most direct route.
- Employees who will likely use Rieder Road will continue on Rieder Road to westbound Wherry Road, as this is the most direct route.

North St. Louis Site

- Employees who will likely use I-44 eastbound were assumed to exit at Jefferson Ave and travel north on Jefferson to access the site rather than continuing on I-44 east to where it becomes I-70 west and exiting at 10th St. This was due to the lack of direct access from the 10th St ramp to the site and potential safety concerns about the neighborhood adjacent to the site.
- Employees who will likely use I-64 eastbound were assumed to exit at Jefferson Ave and travel north on Jefferson to access the site. A potential new interchange along I-64 at 22nd Street may also be utilized by employees at some point in the future; however because the construction of this interchange is speculative it was not assumed to be part of the route to the site. The addition of this interchange should only improve traffic operations for vehicles traveling northbound on Jefferson to access the site.
- Employees who will likely use I-55 northbound were assumed to use I-55 north to I-44 east to I-70 west and exit at 10th St. Despite no direct access and potential safety concerns, this route was found to require significantly less out of distance travel and had far fewer signalized intersections than any other route and therefore was considered to be the most desirable.
- The assumed route to the facility for employees who exit at 10th St is as follows—10th St north to Madison St west to 11th St south to Howard St west to 13th St south to Cass Ave west. This route was chosen for the following reasons--Madison St provides the first opportunity to cross over I-70/44, 11th St is the first street past the over pass, 11th St dead ends into Howard St, and 13th St provides the first connection to Cass Ave.
- It was assumed that all employees using Jefferson Ave to access the site will use the entrance located on Jefferson Ave because it is the most direct. It was assumed that half of the employees using Cass Ave to access the site will use the Cass Ave entrance, while the other half will use the Jefferson Ave

entrance. This is due to the likelihood that the Cass Ave entrance will back up, making the Jefferson entrance more desirable.

Site-Specific Routing Assumptions--Egress

Mehlville Site

- Employees who will likely use I-270 eastbound for their evening commute were assumed to exit the site and travel north on MO 21 (Tesson Ferry) and use the entrance ramp from MO 21 (Tesson Ferry) to I-270 eastbound rather than taking Butler Hill Road east to I-55 north to I-270 east. This was due to MO 21 (Tesson Ferry) being a higher speed, higher capacity route than Butler Hill Road.

- Because there is no traffic signal at the southernmost entrance, it was assumed that employees that want to travel north on MO 21 (Tesson Ferry), and thus need to make a left turn out of the facility, will use the northernmost entrance at Butler Hill Road. All other employees are assumed to exit the facility at the same location that they use to enter during the AM ingress.

Fenton Site

- Employees who will likely use I-44 westbound for their evening commute were assumed to use the I-44 west ramp at Bowles Avenue. While exiting the facility via Mraz lane would provide the ability to access I-44 westbound without going through the signalized intersection at Bowles Ave, the out of distance travel required makes that route less desirable.

- Employees who will likely use I-44 eastbound for their evening commute, to access I-44 or I-270, were assumed to use Mraz Lane to South Highway Drive to I-44 east slip ramp, as this is the most direct route.

- Employees who will likely use MO-141 northbound for their evening commute were assumed to use North Highway Drive to MO-141 northbound. While it is possible to avoid the signal at Valley Park Road by entering I-44 westbound and then immediately exiting in advance of MO-141 northbound, it's anticipated that there will be less congestion on North Highway Drive than on I-44, and North Highway Drive route does not require any merging.

- Employees who will likely use MO-141 southbound for their evening commute were assumed to use southbound Bowles Avenue to MO-141 southbound, as this is the most direct route.

St. Clair County Site

- Employees who will likely use I-64 westbound for their evening commute were assumed to either use the I-64 west ramp at Rieder Road or to use the I-64 west ramp at IL-158/US 50. Both routes are similar in length and efficiency, and therefor traffic volumes were split equally.

- Employees who will likely use I-64 eastbound for their evening commute were assumed to use the I-64 east ramp at Rieder Road, as this is the most direct route.

- Employees who will likely use US 50 northbound for their evening commute were assumed to either use IL-158 eastbound, or use the I-64 west ramp at Rieder Road to the US 50 east exit. Both routes are similar in length and efficiency, and therefore traffic volumes were split equally.

- Employees who will likely use IL-158 westbound for their evening commute were assumed to use Wherry Road to IL-158 westbound, as this is the most direct route.

- Employees who will likely use Rieder Road for their evening commute were assumed to turn north off of Wherry Road onto Rieder Road, as this is the most direct route.

North St. Louis Site

- Employees who will likely use I-44 westbound for their evening commute were assumed to exit the site and travel south on Jefferson Ave and use the entrance ramp from Jefferson Ave to I-44 westbound rather than using the 11th St entrance ramp to I-70 eastbound, which becomes I-44 westbound. This was due to the lack of direct access from the site to the 11th St ramp.

- Employees who will likely use I-64 westbound for their evening commute were assumed to exit the site and travel south on Jefferson Ave and use the entrance ramp from Jefferson Ave to I-64 westbound. A potential new on-ramp to I-64 westbound via 22nd Street may also be utilized by employees at some point in the future; however because the construction of this interchange is speculative it was not assumed to be part of the route from the site. The addition of this interchange should only improve traffic operations for vehicles traveling southbound on Jefferson to access I-64 westbound.

- Employees who will likely use I-55 southbound for their evening commute were assumed to use the 11th St entrance ramp to I-70 east to I-44 west to I-55 south. Despite no direct access, this route was found to require less out of distance travel and had far fewer signalized intersections than any other route and therefore was considered to be the most desirable.

- The assumed route from the facility for employees who use the 11th St entrance ramp is as follows—Cass Ave east to N. Florissant Rd/13th St north to St. Louis Ave east to 11th St south. This route was chosen because while there are other parallel routes, N. Florissant Rd is higher speed and higher capacity that the other local streets, and St. Louis Ave seems to provide the safest (least desolate) connection to 11th St.

- Employees who will likely use I-70 westbound for their evening commute were assumed to use the 10th St entrance ramp. The assumed route to get to this ramp was as follows—Cass Ave east to Broadway north to N Market St west to 10th St north. While requiring several turns and using many lower speed local roads, this route was found to be the most direct way to get from the site to I-70

westbound. All other routes would require significant out of distance travel with multiple signalized intersections.

- It was assumed that employees will use the same location to exit the facility that they used to enter the facility for the reasons listed in the ingress discussion.

Method for Determining Future Year No Build Traffic Volumes

The future year (2040) traffic volumes were primarily based upon data provided by East-West Gateway from their Regional Travel Demand Model. Additionally, data provided by the Illinois Department of Transportation provided future traffic volumes for many of the roadways in the vicinity of the St. Clair County site. Growth factors for roadways not included in the East-West Gateway Regional Travel Demand Model were based on the growth factors calculated for other roadways in close proximity that were included in the model.